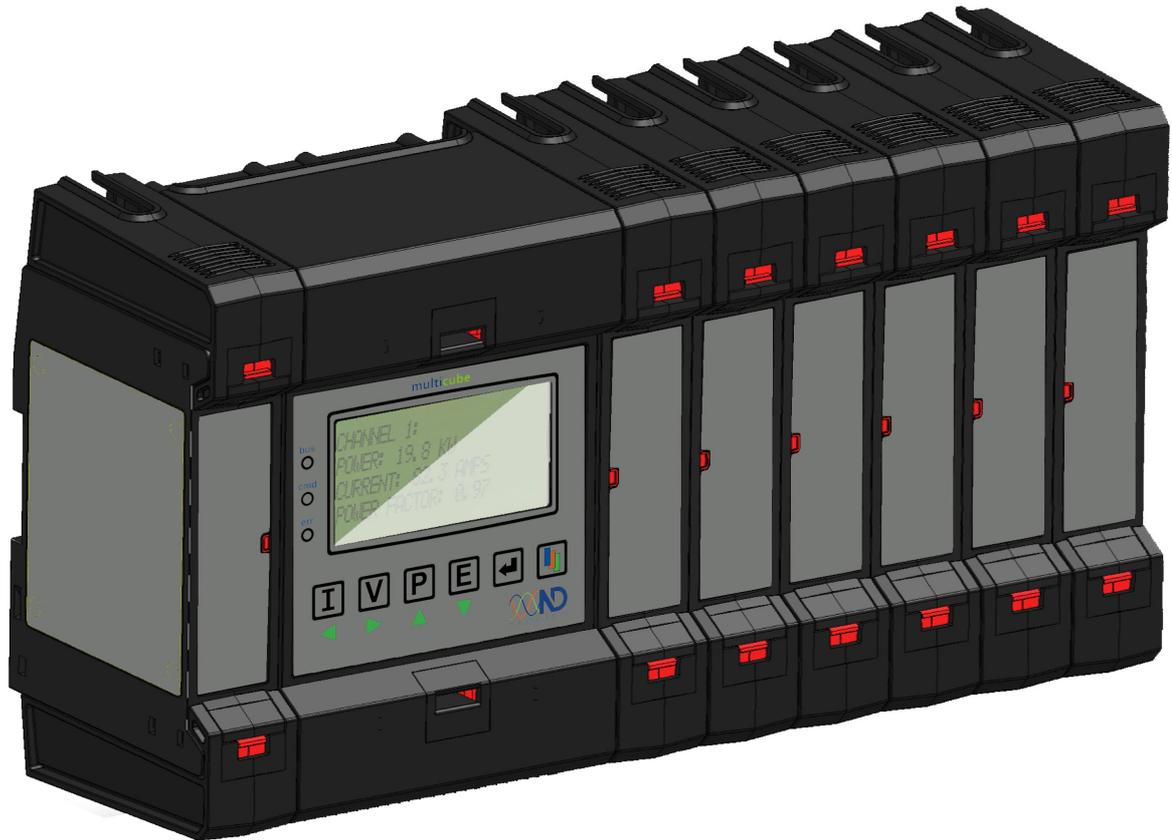


multicube

*Modular Metering System
Remote Display*



Revision 8

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1. Description

The **multicube** modular electricity metering System simultaneously monitors up to 20 three-phase loads or up to 60 single-phase loads (or a combination of both load types). The system integrates load measurement I/O functions logging and communications in a single, flexible unit which can be tailored to suit a variety of energy management installations.

The remote display allows the readings of each of the loads to be viewed at a distance from the main metering system. The display is housed in an enclosure designed to fit in a standard 92mm square hole. A 128x64 dot graphic LCD is used for the display and four keys on the front of the enclosure allow selection of the readings for display. These keys allow you to step through of the current and voltage readings, the power and energy readings for each load and to step through and select a desired load.

The remote display accesses the data on the **multicube** modular electricity metering System using the Modbus protocol over an RS485 connection. Three LED's on the front panel of the display indicate from the top down:

- TX** a Modbus message has been transmitted,
- RX** a reply has been received,
- ERR** the reply has an error.

2. Safety

This manual gives details of safe installation of **multicube** electricity metering system remote display. Although the power and communications for the remote display are isolated from the possible high voltages measured by the metering system, connection of the remote display cable to the system could involve working in a hazardous environment. Safety may be impaired if the instructions are not followed or the system is used in a manner not specified by the manufacturer. Labels give details of equipment ratings for safe operation. Take time to examine all labels before commencing installation. Safety symbols on the meter have specific meanings.



Safety may be impaired if the instructions are not followed or the meter is used in a manner not specified by the manufacturer.



Contains no user serviceable parts. Field wiring and commissioning should only be carried out by qualified personnel, in compliance with applicable national regulations.
e.g. National Electrical Code (NEC) for US; Canadian Electrical Code for Canada

For further information contact the manufacturer:

Address: Northern Design (Electronics) Ltd: 228 Bolton Road, Bradford, West Yorkshire, BD3 0QW. (UK)

Web: <http://www.ndmeter.co.uk>

Email: sales@ndmeter.co.uk

2.1. Maintenance

The equipment should be maintained in good working order. Damaged equipment must be returned to the manufacturer (or their authorised agent) for repair. The display may be cleaned by wiping lightly with a soft cloth. No solvents or cleaning agents should be used. The communications and power supply must be isolated before cleaning any part of the equipment.

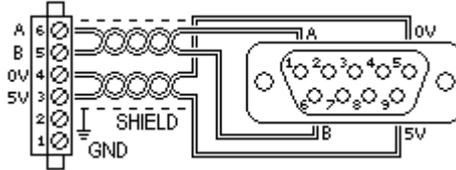
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3. Installation

3.1. Multicube Connection Cable

The multicube remote display is connected to the multicube system by a 600V rated four core screened cable. This cable carries 5V power and ground along with a pair of balanced communication lines conforming to the RS-485 standard. At the multicube system end the cable is terminated in a male 9 way D-SUB connector. This mates with a corresponding female 9 way D-SUB connector under the lower cover of the multicube main display unit. At the remote display end the cable is connected to a 6 way in line screw terminal which mates with a corresponding socket on the rear of the remote display.

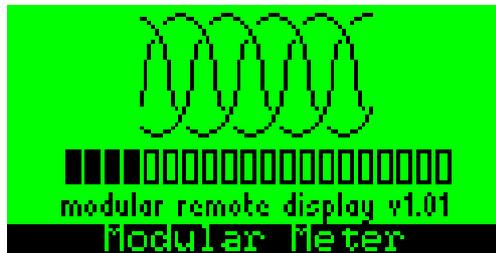


4. Power Up/Configuration

4.1. Powering up a multicube remote display

Before supplying power to the multicube remote display check all wiring, ensure the unit is securely mounted to a stable surface and clean up all debris, scraps of wire etc.

Power for a remote display is provided from the multicube system along with the communications through the cable connecting the display with the multicube. When power is applied to a multicube remote display, the system settings are requested along with the configuration settings for each of the connected meters. The power up screen displays the progress of this system configuration check.

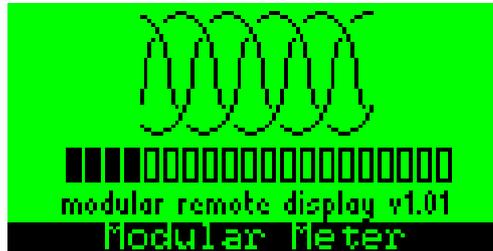


Symbol	Meaning
□	Module Position Empty
▣	Valid Meter in Module Position
■	Meter Text Successfully Loaded

Other information on the Power up screen, such as software version, may be required when contacting the manufacturer for technical support.

4.2. Powering-Up a Configured Multicube System

- Switch on the auxiliary supply to the unit



The power up screen details the software version for the Remote Display Unit and a progress bar shows connection of each Sub Module as its configuration is obtained from the [multicube](#). This screen is displayed until the configuration of the system and all connected meters are loaded. The screen will also be displayed if communication with the [multicube](#) system is lost and the configuration settings will be reloaded.

The remote display will first load the main [multicube](#) system configuration and then step through the possible modbus ID's of the meters. If a valid configuration is found for a meter a hatched block is shown in the position. After the configurations have been loaded the remote display will request the text assigned to each meter with a valid configuration. If the meter successfully replies with the text the block will turn black. Otherwise default text will be assigned to the meter.

- **Connected Loads List**



Use the   keys to select a load from the list and press  to show the default measurement page for the highlighted load.

The bottom line (Highlighted Text) gives details of the selected module:

- **The Communications ID (eg Modbus ID).**
- **The selected channel ("Ch1"- "Ch3" or "3-Ph" for 3-Phase Loads)**
- **The Current Transducer nominal primary current.**

Un-commissioned systems will display default names and all meters will be set to measure 3-Phase loads. It may be useful to refer back to this **Connected Loads List** after commissioning to refresh the system configuration. The last item of the connected loads list 'Refresh List' will restart the process of loading configurations. It is required to run 'Refresh List' on the remote display if changes are made to the [multicube](#) system that would affect the displayed data. E.g. 3ph/1ph configuration, autorotation ON/Off, CT Primary setting

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4.2.1. Default Measurement Page



This page shows measured values from the selected meter/load. This data is meaningless for an unconfigured **multicube** system as the programmed Current Transducers may not match the physical devices fitted.

The bottom line (Highlighted Text) shows details of the selected load as:

- **The Communications ID (eg Modbus ID).**
- **The programmed Load Name (Up to 14 Characters)**

An LED is illuminated on the selected Module to indicate which phase is displayed on the LCD.

Display Current & Voltage parameters for the selected load.		<i>Press/Release to show next page Press/Hold for fast scroll</i>
Display Power & Energy parameters for the selected load.		
Select a load to be displayed (The LED associated with the selected load is illuminated)		<i>Press/Release to show the default measurement page for the highlighted load from a Load List</i>
Step through loads to be displayed (The LED associated with the selected load is illuminated)		<i>Press/Release to select next Load Press/Hold to select from a Load List</i>

Note: A different set of parameter display pages is available for single phase and 3-phase loads. For a list of available pages 'Load display menus' Section.

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Load Display Menus

Each metered load is represented in display menus which are accessed using the user keypad on the *Master Display Unit*.

4.2.2. Capacitive and Inductive Loads

Measured parameters such as kvar and Power Factor are displayed with a symbol indicating the type of load:

Inductive Loads:  Capacitive Loads: 

4.2.3. 3-Phase Load Display Menus

3-Phase Current & Voltage Display Menu



Select Current/Voltage Pages



Select Load



Instantaneous Phase Currents

- Phase 1 Current
- Phase 2 Current
- Phase 3 Current



Peak Hold Phase Currents

- Peak Hold Phase 1 Current
- Peak Hold Phase 2 Current
- Peak Hold Phase 3 Current



Current Demand (Sliding Window)

- Current Demand Phase 1
- Current Demand Phase 2
- Current Demand Phase 3



Peak Current Demand (Sliding Window)

- Peak Hold Current Demand Phase 1
- Peak Hold Current Demand Phase 2
- Peak Hold Current Demand Phase 3



Min Current Demand (Sliding Window)

- Minimum Hold Current Demand Phase 1
- Minimum Hold Current Demand Phase 2
- Minimum Hold Current Demand Phase 3



Current Total Harmonic Distortion (THD)

- %THD Phase 1 Current
- %THD Phase 2 Current
- %THD Phase 3 Current

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Instantaneous Phase to Neutral Voltages

- Phase 1 to neutral volts
- Phase 2 to neutral volts
- Phase 3 to neutral volts



Instantaneous Line-Line Voltages

- Line 1 – Line 2 volts
- Line 2 – Line 3 volts
- Line 3 – Line 1 volts



Peak Hold Phase to Neutral Voltages

- Peak Hold Phase 1 Volts
- Peak Hold Phase 2 Volts
- Peak Hold Phase 3 Volts



Voltage Demand (Sliding Window)

- Voltage Demand Phase 1
- Voltage Demand Phase 2
- Voltage Demand Phase 3



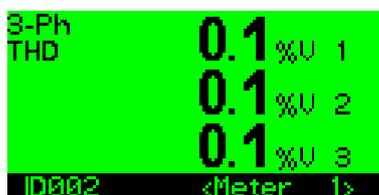
Peak Voltage Demand (Sliding Window)

- Peak Hold Voltage Demand Phase 1
- Peak Hold Voltage Demand Phase 2
- Peak Hold Voltage Demand Phase 3



Min Voltage Demand (Sliding Window)

- Minimum Hold Voltage Demand Phase 1
- Minimum Hold Voltage Demand Phase 2
- Minimum Hold Voltage Demand Phase 3



Voltage Total Harmonic

- %THD Phase 1 Volts
- %THD Phase 2 Volts
- %THD Phase 3 Volts

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3-Phase Power & Energy Display Menu



Select Power/Energy Pages



Select Load



Instantaneous System Power

System Real Power kW (P)
 System Reactive kvar (Q)
 System Power Factor (COSφ)



kW Demand (Sliding Window)

kW Demand
 Peak Hold kW Demand
 Minimum Hold kW Demand



System Frequency, Neutral Current, kVA (S)

Frequency (Measured on Volts Ph1)
 Neutral Current
 System Apparent Power kVA



Per Phase kW (P1-P3)

Phase 1 Real Power (kW)
 Phase 2 Real Power (kW)
 Phase 3 Real Power (kW)



Per Phase Reactive Power (kvar)

Phase 1 Reactive Power (Inductive shown)
 Phase 2 Reactive Power (Inductive shown)
 Phase 3 Reactive Power (Inductive shown)



Per Phase Power Factor (COS φ)

Phase 1 Power Factor
 Phase 2 Power Factor
 Phase 3 Power Factor



Total System Import Energy

Real Energy kWh
 Reactive Energy (kvarh)
 Apparent Energy (kVAh)

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4.2.4. Single-Phase Meter Display Menus

NOTE: Each single-phase load is associated with a phase voltage determined by its position in a 3-Phase metering module. The phase voltages connected to the Master Display Unit are numbered Ph1 - Ph3 and this is indicated on the single-phase pages as "Ph1" - "Ph3".

Single-Phase Current & Voltage Display Menu



Select Current/Voltage Pages



Select Load



Instantaneous Phase Current

- Phase Current
- Peak Hold Phase Current
- Bar Graph of Amps Scale = 0 - 120% CT Prim



Current Demand (Sliding Window)

- Phase Current Demand
- Peak Hold Phase Current Demand
- Minimum Hold Phase Current Demand



Instantaneous Phase to Neutral Voltage

- Phase to Neutral Voltage
- Peak Hold Phase Voltage
- Bar Graph of Volts Scale = 0 - 120% Vnom



Voltage Demand (Sliding Window)

- Phase Voltage Demand
- Peak Hold Phase Voltage Demand
- Minimum Hold Phase Voltage Demand

Single-Phase Power & Energy Display Menu



Select Power/Energy Pages



Select Load



Instantaneous Phase Powers

- Single Phase Real Power (P)
- Single Phase Reactive Power (Q)
- Single Phase Power Factor (COS ϕ)



Power Demand (Sliding Window)

- Single Phase kW Demand
- Single Phase Peak Hold kW Demand
- Frequency (From Phase 1 volts)



Single Phase Total Import Energy

- Single Phase Real Energy (kWh)
- Single Phase Reactive Energy (kvarh)

5. Specification

5.1. Multicube Modular Meter Remote Display

GENERAL	
Temperature	Operating -10°C to +55°C Storage -25°C to +70°C
Humidity	< 75% non-condensing
Environment	IP54 (when correctly mounted, as described, in a panel) Altitude <2000m
POWER SUPPLY	
DC Power From Master Display	DC Power Supply: 5.0V DC Maximum Load: 0.5 W
MECHANICAL	
Terminals	Rising Cage. 4mm ² (12 AWG) cable max.
Cable	600V 4 core shielded twisted pair
Enclosure	DIN 43700 96 x 96
Material	Mablex® with fire protection to UL94-V-O. Self extinguishing
Dimensions	96 x 96 mm x 83.5 mm (72 mm behind panel)
Weight	~ 250 gms
SAFETY	
Conforms to	EN 61010-1 Installation Category III & BS 8431

E. & O. E.

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