200ADM-P Mk2

Current Injection System with Phase Shift

Features

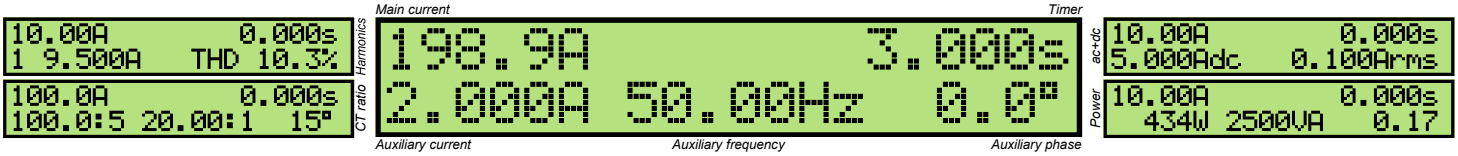
- 0-200A output current
- True RMS metering with 1 cycle capture
- Variable auxiliary AC voltage/current output with phase shift
- Auxiliary metering input V, f, φ, Z, P, S, PF, CT ratio, THD
- Variable auxiliary output 12-220VDC
- Multi-function auto-range timing system
- Current limit mode for fine control
- Data storage to USB memory key including waveform & harmonics
- USB keyboard interface
- Automatic mains voltage selection

The 200ADM-P Mk2 is a current injection system with a wide range of advanced features including phase shift, data storage and total harmonic analysis.

The unit has a range of outputs allowing injection of currents between 1mA and 200A. Voltages up to 240V are available on the main outputs allowing high impedance current relays to be tested. True RMS metering with single cycle capture is provided. Four current ranges allow the full scale of the meter and trip level to be set independently of the selected output. Industry standard safety connectors are used throughout for safe, reliable convenience.

The unit has a comprehensive timing system linked to the outputs allowing trip times, reset times and reclose times to be quickly measured to a high degree of accuracy. The timer includes a current operated mode and can accurately test instantaneous trips.

Two USB host sockets are provided to connect a memory key and keyboard. Results of every test can be stored to the memory key in spreadsheet format for later analysis. The keyboard allows entry of a comment against each result. In addition a graphics file of the waveform may be stored to the memory key. Harmonic analysis results can also be recorded.



The 200ADM-P Mk2 has a flexible auxiliary AC output that can be used at up to 260V for voltage relays or up to 10A for current relays. The phase and frequency of this output are fully adjustable. This combination of voltage and current allows testing of relays that require two voltages, one voltage and one current or two currents.

An auxiliary metering module is provided that meters AC and DC voltage, current and frequency from the auxiliary outputs or external signals. The module can also take measurements in conjunction with the main current output to meter phase angle, power, impedance, CT ratio and THD.

A variable stabilised DC supply with current limit is provided to power the relay under test.

200ADM-P Mk2 Applications

IEEE no.	Type
21	Distance protection (phase at a time)
24	Volts/Hz
25	Check sync
27/59	Under/over voltage
32/P/Q	Directional power
37	Under-current/power
40	Field relay
46N	Negative sequence overcurrent relay
50/76	Instantaneous overcurrent
50	Ground fault relay
50V	Voltage restrained overcurrent
51	IDMT overcurrent relay
55	Power factor relay
59G	Neutral voltage displacement
67	Directional overcurrent
67N	Directional ground fault
78	Phase angle
79	Auto recloser
81	Under/over frequency
85	Pilot wire relay
86	Lockout relay
87	Differential relay
91	Directional voltage relay
92	Power directional relay
94	Tripping relay
	Voltage regulating relay
	Miniature circuit breakers
	Thermal relays
	CT mag curves

T&R TEST EQUIPMENT

TRUSTED & RELIABLE

Auxiliary Metering

The auxiliary metering input on the 200ADM-P Mk2 measures AC and DC voltage and current. The input is rated for 300V rms or 5/10A rms (10A for waveforms with a CF up to 1.5, 5A rms for a CF of 3).

The module can take measurements using the main output and auxiliary input together to measure phase angle, power, impedance and CT ratio (for both 1A and 5A CTs). It can also analyse the THD of the main output and auxiliary input waveform. Measurements may be logged to the USB key.

DC:	Volts/Amps DC average & rms ripple
AC:	Volts/Amps AC rms, frequency & phase angle
Power:	S (VA), P (W) and power factor
Impedance:	Z, X & phase angle
CT ratio:	Ratio relative to 1A & 5A CT and phase angle
Harmonic:	THD on the main o/p & aux i/p

Auxiliary AC Output

The auxiliary AC output supplies an extra isolated voltage or current to the relay under test. The output is a digitally generated pure sine wave, and three ranges are provided for maximum flexibility (two voltage ranges and one current range). The output is adjustable from zero and can be phase shifted through 360°. This output is also linked to the timer circuit.

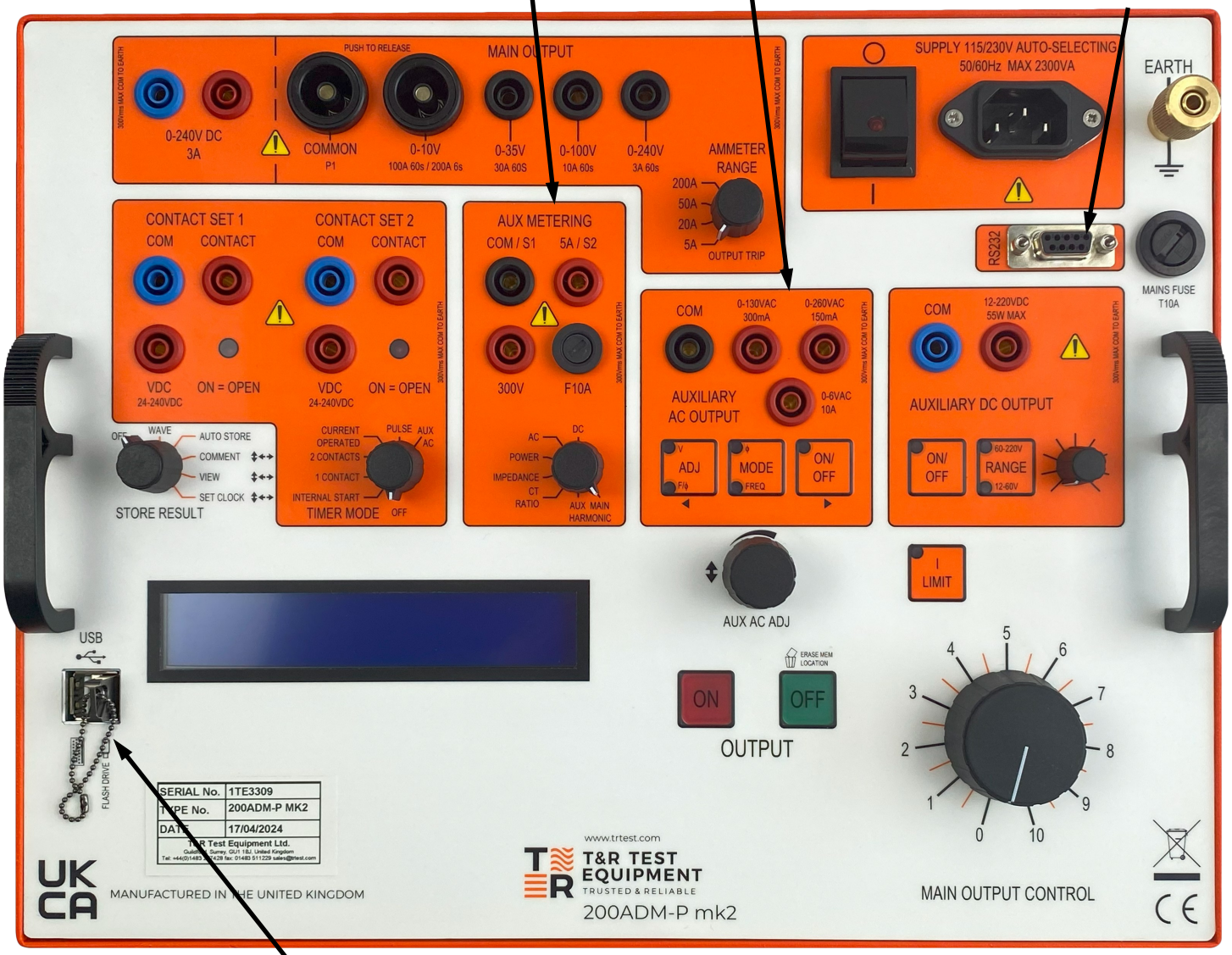
1 Voltage—Over/Under Voltage Relays

Testing over and under voltage relays with the 200ADM-P Mk2 is simple—even checking delay times. Connect the main output in series with the auxiliary output to generate voltage steps with timing.

1 Voltage—Frequency Relays

The auxiliary ac output can be either phase locked to the supply or switched to variable frequency mode. Operating points are easily determined and the response of the relay timed.

RS232 port for calibration purposes



USB ports For connecting USB memory key and keyboard.

USB memory key

USB keyboard

1 Voltage + 1 Current—Various Relays

The phase shifting capability of the auxiliary output is ideal for testing directional overcurrent and earth fault relays. The main output is used to inject current and the auxiliary output supplies the voltage coil. The same configuration is used to test reverse power relays and phase at a time testing of distance protection. The test of these relays is eased further by the direct display of W, VA, phase angle and impedance. Testing an Automatic Voltage Regulating (AVR) relay with line drop compensation also requires a current and a voltage with phase-shift. The 200ADM-P Mk2 is ideally suited to this test, and the two contact inputs can be used to show the state of the up/down contacts on the relay.

2 Currents—Bias Differential Relay

The 10A auxiliary AC output can be used to supply a second current to the relay under test as required by differential protection. This output in independent of the mains and can be used when a stabilised current is required.

2 Voltages—Check Sync Relay

The combination of the main output used as a voltage source and the auxiliary ac output meets the requirements of check-sync testing. With the auxiliary output set to variable frequency different frequencies may be applied to the two relay inputs for checking the frequency matching function of the relay. Switching to phase lock mode then allows the phase checking function of the relay to be tested.

Auxiliary DC Output

The 200ADM-P Mk2 has a stabilised, variable DC output for powering the relay under test with an output of 12-220V in two ranges. The output is current limited and can supply load requiring high inrush currents.

I Limit

The 200ADM-P Mk2 has a current limit function for the main output that gives very fine current control for currents up to 10A. Low impedance loads such as microprocessor relays present no problem to the 200ADM -P Mk2; currents can be accurately controlled down to a few mA.

Storage of Results

All test results from the 200ADM-P Mk2 can be stored in a USB memory key. The unit has a real-time clock to time and date-stamp all results. To log the results, first enter a comment for your results using the digital pot and arrow keys or optional keyboard, and then select AUTO STORE.

Whenever the timer stops, the time, current and all other parameters are added to a spreadsheet file on the USB key. You can then view the current set of results on the display or take the USB key out and open the file on your PC. All results are stored in a folder on the USB key named with the test date in a file named with the time.

Also the 200ADM-P Mk2 can store a .csv file of the wave-form to the USB key.

Timing

The timing system is linked to the main output and the auxiliary AC output. This allows timing of a wide range of devices.

Mode	Timer Start	Timer Stop
Internal start	Press 'ON'	Contact 1 or 2 change
1 contact	Contact 1 1st change	Contact 1 2nd change
2 contacts	Contact 1 change	Contact 2 change
MART (Multiple Au-to-Reclose Timing)	Contact 2 change	Contact 1 change
Current operated	Current > 10% of metering range	Current <10% of metering range
Pulse	Press 'ON'	200ms
Aux AC	Aux AC on/ switch freq to φ/ switch φ to freq	Contact 1 or 2 change

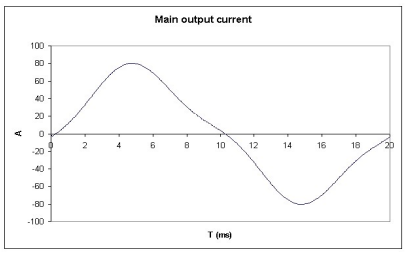
For example, to time an IDMT current relay the relay contacts are connected to contact set 1 and "internal start" mode is selected. When the main output is switched on, current injection and the timer starts. When the relay trips the timer stops and the output is switched off. All contacts are sensitive to changes of state rather than setting for normally open or normally closed. At the end of a test when the timer stops the output is switched off to safeguard the relay under test. LEDs indicate the contact state.

MART mode is used to time multiple re-close actions on an auto re-closing relay. 99 time results can be stored and logged to the USB memory key.

Setting the timer to AUX AC starts the timer when the auxiliary ac output is switched on or the output is switched from variable frequency to phase control or vice versa. This is ideal for testing trip times on under or over voltage protection and testing Check Sync Relays.

In addition the unit will time between changes on one set of contacts or two sets of contacts. Current operated mode starts and stops the timer on the rise and fall of current on the main output. This mode will test devices where the breaking contacts are in series with the sense circuit, as in thermal or thermal-magnetic circuit breakers.

Pulse mode is used for setting the current level in devices sensitive to heating. Current is injected for 200ms and the current recorded.



Sample data stored on USB key

```
Time,      Date,    Main A,Timer,  Aux A,  Aux V, Phase, Freq Hz, Comment
10:53:12,12/12/09,  2.000,  10.000, 0.000,  10.0,  10.3,  50.00,  Overcurrent subl relay 12
10:53:30,12/12/09,  5.000,  3.000,  0.000,  10.0,  10.3,  50.00,  Overcurrent subl relay 12
10:54:10,12/12/09,  10.00,  1.000,  0.000,  10.0,  10.3,  50.00,  Overcurrent subl relay 12
```

200ADM-P Mk2 Specification

Main Output

The main output on the unit has four taps, allowing the selection of output voltages up to 240V and output currents up to 200A.

Range	Current				Output @230V	
	Cont	5 min*	1 min*	6 sec**	O/C	Load V
10V	33A	67A	100A	200A	10.5V	8.7V@100A
35V	10A	20A	30A	-	36V	32V@30A
100V	3A	6A	10A	-	108V	99V@10A
240V	1A	2A	3A	-	276V	259V@3A
240Vdc	1A	2A	3A	-		

**Off time of 15 minutes. On times based on an ambient temperature of 25°C.*
***6 second intermittent ratings available with 230V supply.*

Protection: over current trip, duty cycle trip, thermal monitoring.

I Limit Mode

The main output has a current limit mode that gives very fine control of output currents up to 10A. It also allows fine current control into very low impedance loads such as digital relays.

Range	Current (A)				Output V @230V	
	Short circuit	Cont.	5 min	2 min	O/C	Load V
10V	10A	3A	6A	10A	8.6V	5V@5A
35V	3A	1A	2A	3A	29V	13V@2A
100V	1A	0.3A	0.6A	1A	88V	40V@0.6A
240V	0.3A	0.1A	0.2A	0.3A	224V	130V@0.2A

Auxiliary DC Output

Range	Maximum A	Continuous rating
12-60V	1A	25W
60-220V	0.23A	25W

Protection: current limit.

Phase-shifting AC Output

Range	Maximum Output Voltage		Current	Current
Range	No load	Full load	Continuous	5 min on/ 15 min off
0-130V	144V	125V	0.23A	0.46A
0-260V	288V	250V	0.11A	0.23A
0-6V	6.6V	5V	5A	10A

Frequency range: 45—100Hz
Phase angle: 0—±180°

Protection: current limit & electronic trip.

Metering

The output is metered by a digital true RMS system with a single cycle capture memory ammeter—whenever the timer stops and the output is switched off, the current reading is held on the display. A current trip is set to 110% of full scale of the selected metering range.

Range	Resolution	Trip current	Accuracy 50Hz*	Acquisition time
5.000A	0.001A	5.5A	±0.5%rdg±5d	20ms
20.00A	0.01A	22A	±0.5%rdg±5d	20ms
50.00A	0.01A	55A	±0.5%rdg±5d	20ms
200.0A	0.1A	220A	±0.5%rdg±5d	20ms

Auxiliary Metering Inputs

Setting	Range	Resolution	Accuracy 50Hz*
Vdc/ac rms	300.0V	0.1V	±0.7%rdg±5d
Idc/ac rms	5.000A CF<3 9.999A CF<1.5	0.001A	±0.7%rdg±5d
Phase	-179.9°—+180.0°	0.1°	±3°
Frequency	40—100Hz	0.01Hz	±0.02%rdg±1d

*For 60Hz operation the accuracy is reduced to ±1%rdg±5d for all current and voltage ranges.

Protection: fuse on current input.

Timing System

Range 0-999.999s/9999.99s/99999.9s autoranging
Resolution 1/10/100ms
Accuracy 0.01%rdg+2d (+4d current operated mode)
Contact o/c 24V
Contact s/c 20mA
Vdc 24—240V

Each contact circuit will auto-select for normally open or normally closed contacts. A DC voltage of 24—240Vdc may also be used to trigger either timer channel. Contact state is shown by an LED.

Supply Requirements

115V/230V ±10% auto-select 50/60Hz 1ph 2300VA max.

Accessories

The 200ADM-P Mk2 is supplied with operating manual, output lead set, mains lead, spare fuses, USB keyboard, USB memory key.

Lead Set specifications

The 200ADM-P Mk2 is supplied with a high quality lead set including:

2 x 5m 25mm² 200A leads terminated in M10 fork crimps

2 x 5m, 2 x 0.5m 2.5mm² 25A leads terminated in 4mm plugs

1 x 5m 2 core auxiliary leads terminated in 4mm plugs.

Optional accessories

Filter unit, RB10 resistor box, pushbutton lead for run-back timing on disc induction relays.

Safety

An earth terminal is provided for connection to a local earth. The unit is designed to comply with BSEN61010 and is CE marked.

Temperature Range

Storage -20°C to 60°C **Operating** 0°C to 45°C

Dimensions

560 x 456 x 265mm

Weight

22.6kg Pelican Case

Note: Due to the company's continuous research programme, the information above may change at any time without prior notification.
Please check that you have the most recent data on the product.

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