

Voltech™

**Voltech PM100 and PM300
Power Analyzers**

**Chart Recorder and Alarm
Interface**

User Manual

TABLE OF CONTENTS

Chapter 1	Introduction
1. 1	PM100/PM300 Interface Cards.
1. 2	Overview of the Chart Recorder. and Alarm Interface.
Chapter 2	Functional Description and Specification of the Chart Recorder and Alarm Interface
2. 1	Chart Recorder Outputs.
2. 2	Relay Contacts.
2. 3	Test Mode.
Chapter 3	Installation
Chapter 4	Example of Use - Output To Chart Recorder
Chapter 5	Menu Summary
5. 1	Top-Level Summary.
5. 2	Analog Output Set-up.
5. 3	Relay Output Set-up.
Post Sale Warranty	

CHAPTER 1

Introduction

1.1 PM100/PM300 Interface Cards

The Chart Recorder and Alarm Interface is one in a range of accessory cards which may be used with the PM100 and PM300 Power Analyzers, to enhance their capability and flexibility.

Each card in the range is a fully integrated, self-contained unit, driven by its own processor, which also communicates with the main instrument. This intelligent inter-processor communication allows the Power Analyzer to check when an accessory has been fitted, making it very easy for you to install. Simply plug in the card, switch on, and the Power Analyzer will recognise which accessory has been fitted and will configure the front panel menu accordingly.

Other cards in the range include:

- **The IEEE488 Interface.**

This allows full remote control of the Power Analyzer from, for example, a Personal Computer using the standard GPIB bus. The interface is fully compatible with IEEE488.1 and IEEE488.2 standards.

- **The Printer (parallel) and RS232 (serial) Interface.**

The parallel interface uses a 25 way D-type socket and connects to most printers: matrix, jet and laser.

The RS232 interface has a 9 way D-type plug, and may be used either to output data, for example, to a serial printer, or to allow full remote control of the Power Analyzer from a Personal Computer.

1.2 Overview of the Chart Recorder and Alarm Interface

The Chart Recorder and Alarm Interface has two separate functions which may be used independently:

Chart Recorder Outputs

The Interface has 12 analog outputs which may be used for driving chart recorders, data loggers and other analog input devices. Each output may be programmed to correspond to one of the parameters measured by the Power Analyzer.

Two Relay Outputs - switchable in three different ways

- When an alarm threshold level has been exceeded.

You may select which parameter is to be tested for the alarm from the list of parameters measured by the Power Analyzer.

- When a demand level has become larger than a programmed limit value.

The demand is defined as the power consumption averaged over a short time - for example 10 minutes. You may select any of W, VA or VAR as the power parameter, program the averaging time, and set the limit value.

- To give a pulse each time a unit of energy (which you may select as kWh, kVAh or kVArh) is measured.

Functional Description and Specification of the Chart Recorder and Alarm Interface

2.1 Chart Recorder Outputs

There are 12 analog outputs which may be used for driving chart recorders, data loggers and other analog input devices.

The basic operation is very simple:

First select which parameter measured by the Power Analyzer is to be used for a particular output, and program a maximum and minimum value for the measured results.

Then, as each new measurement of the selected parameter is made, the result is used to update the value of the output voltage on the corresponding analog output.

Each output has a voltage range of 0 to 5V, with 0V being used for the programmed minimum value, and 5V for the maximum. If required, the number programmed as minimum can be higher than that programmed for maximum, to allow, for example, the plot produced on a chart recorder to be upside down.

Available Parameters for PM100

Ch1	Vrms, Arms, W, VA, VAr, Power Factor, Frequency, V or A peak, V or A THD, V, A, W, VA, VAr or PF at the fundamental frequency, V, A or W at a selected harmonic.
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Available Parameters for PM300

Ch1, Ch2 or Ch3	Vrms, Arms, W, VA, VAr, Power Factor, Frequency, V or A peak, V or A THD, V, A, W, VA, VAr or PF at the fundamental frequency, V, A or W at a selected harmonic.
Σ	Vrms, Arms, W, VA, VAr, Power Factor, V, A, W, VA, VAr or PF at the fundamental frequency.
Neutral	Arms, A peak, A THD, A at the fundamental frequency, A at a selected harmonic.

Specification

Number of outputs	12
Output voltage range	0V to 5V
Common 0V	Connected to case
Accuracy	1% typical
Output resistance	<100 Ω
Output protection	Against short circuit
Response time	500msec typical
Connector	15-way, 'D'-type female

Connector Pins

Output	1 2 3 4 5 6 7 8 9 10 11 12	Common 0V
Pin	1 2 3 4 5 6 7 8 9 10 11 12	13, 14 and 15

2.2 Relay Contacts

The Chart Recorder and Alarm Interface offers two relay outputs, each of which may be switched in one of three different ways:

1. When an alarm threshold level has been exceeded.

You may choose the parameter tested for the alarm from the same list as that shown above of parameters available for the Chart Recorder Outputs.

The threshold level may be programmed as a maximum limit - where values higher than the limit will switch the relay, a minimum limit - where values lower than the limit will switch the relay, or both a minimum and a maximum limit - where values outside the range from minimum to maximum will switch the relay.

In addition, to give the most versatile use, the contacts can be programmed to be normally open - where the alarm condition will close the contacts, or normally closed - where the alarm condition will open the contacts.

2. When a Demand level has been exceeded.

Demand is the average power consumed over a time which you may program.

To measure Demand, the PM100/PM300 sets up a 'measurement time' equal to 1/50th of the programmed time, during which it computes the average power. The Analyzer then forms a moving average for the last 50 such results, and uses this moving average to set the state of the relay.

Again to give the most versatile use, the contacts can be programmed to be normally open - where the excessive Demand will close the contacts, or normally closed - where the excessive Demand will open the contacts.

Available Demand Parameters for PM100

Ch1 W, VA, VAr

Available Demand Parameters for PM300

Ch1, Ch2 or Ch3	W, VA, VAr
Σ	W, VA, VAr
Neutral	(None)

Data for both PM100 and PM300

Demand time	1 to 60 mins
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3. Pulse Output

The relay may be programmed to be pulsed once for each unit of energy measured.

As with other uses, the contacts can be programmed to be normally open - where each unit of energy will pulse the contacts closed, or normally closed - where each unit of energy will pulse the contacts open.

Available Energy Parameters for PM100

Ch1	kWh, -kWh, kVAh, kVArh, - kVArh
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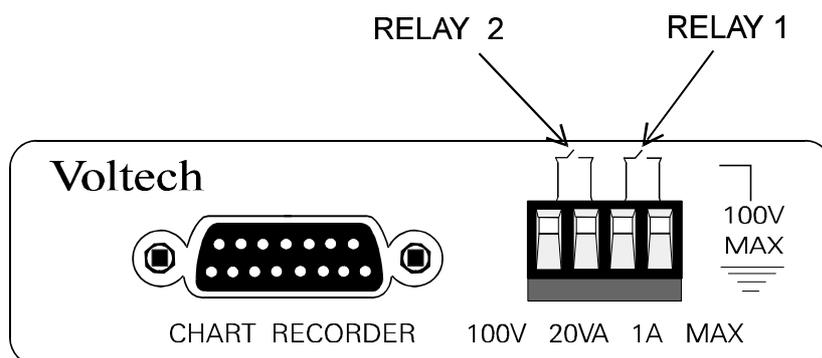
Available Energy Parameters for PM300

Ch1, Ch2 or Ch3	kWh, -kWh, kVAh, kVArh, - kVArh
Σ	kWh, -kWh, kVAh, kVArh, - kVArh
Neutral	(None)

Specification

Number of relays	2
Contact rating	
Voltage	100V max
Current	1A max
VA	20VA max
Contact isolation	100V to case
Pulse duration	500msec typical

Connector Pins

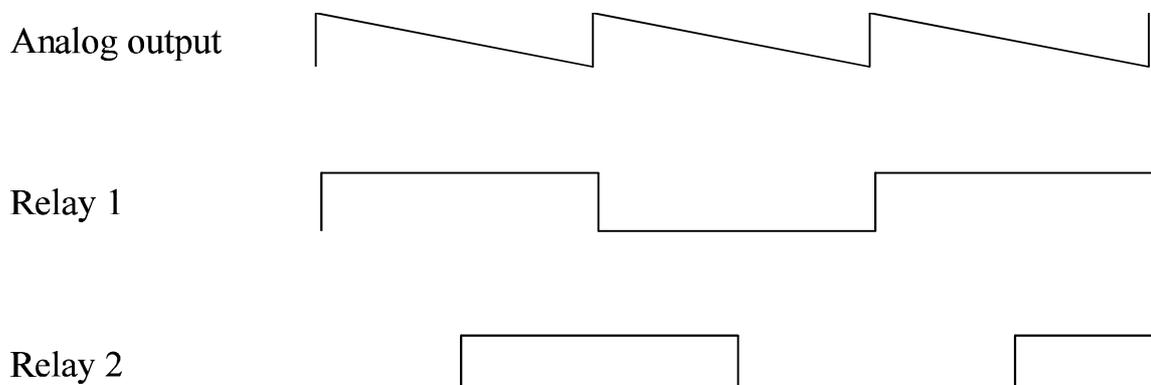


2.3 Test Mode

When setting up an experiment where a piece of equipment such as a chart recorder is connected to an output from the Interface, it may be useful to check that the connections have been correctly made before proceeding to take measurements. The Test Mode allows you to do this.

When the Test Mode has been selected from the front panel menu, the PM100/PM300 Analyzer generates a test pattern which is continuously used to drive the analog outputs and the relays. The pattern will continue to repeat until you press the [↵] key to exit from the Test Mode.

The test pattern for the analog outputs is a sawtooth waveform, which is repeated every 5 seconds; when running, the same waveform is also shown on the front panel display in the form of a bar-graph. The test for the relays is to close the contacts for 5 seconds, and then to leave them open for the next 5 seconds.



CHAPTER 3

INSTALLATION

DANGER OF ELECTRIC SHOCK

Only qualified personnel should install this equipment, after reading and understanding this user manual, and the section entitled Important Safety Instructions in the main PM100/PM300 Power Analyzers User Manual. If in doubt consult your Voltech distributor.



To install the Chart Recorder and Alarm Interface in your PM300 Power Analyzer

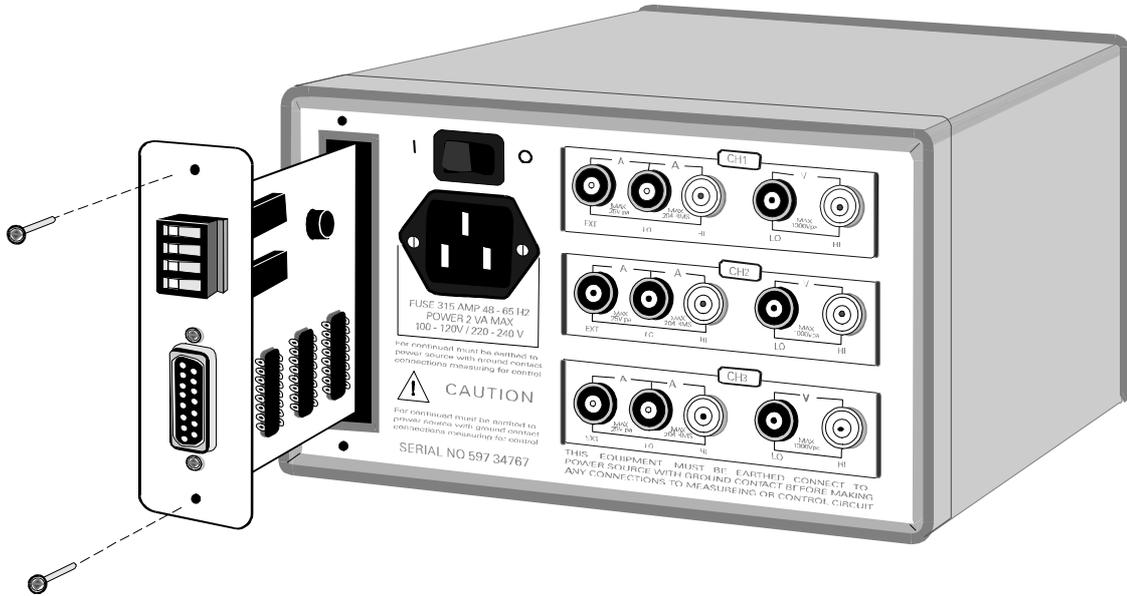
- Turn off the Power Analyzer, and disconnect all power and test leads.
- Undo the two screws, and remove the cover plate positioned on the left hand side of the rear panel when viewed from the rear.

DO NOT allow anything which may conduct electricity to fall into the slot revealed by removing the cover plate.

- **WARNING - STATIC ELECTRICITY**

Make sure that you handle the Chart Recorder and Alarm Interface only by the metal back panel attached to the card. Unless you are earthed by a suitable wrist strap, touching the printed circuit board may cause damage due to static electricity.

- Insert the Interface Card into the slot revealed by removing the cover plate, making sure that it is sliding correctly in the card guides. Note that the card is inserted with the pcb edge connector at the bottom.
- Replace the two screws to secure the card in place.



The Power Analyzer is now ready for use.

To check that the Chart Recorder and Alarm Interface has been recognised by the Power Analyzer software, press the MENU key on the front panel, followed by the [**A**] key. The display should show



If this menu is not available, turn off the power, disconnect the power lead and any other leads, and check that the Interface has been correctly plugged in. On continued failure, contact your Voltech distributor.

CHAPTER 4

Example of Use-Output To Chart Recorder

The following example shows how to program analog output 6 from the interface card to correspond to the rms value of the current measured on Channel 3 of a PM300 Analyzer, so that the changes of the current with time can be recorded. Assume that the current will be in the range 0 to 10Arms.

Hardware Connections

- Connect the chart recorder input terminals to pin 6 (Hi) and pin 15 (Lo) of the 15 way D-type connector on the Interface Card.

Menu Set-up

- Press the [MENU] key on the PM300 Analyzer front panel to reveal the display

```
SELECT MENU
M[0] OUTPUTS
```

- Press the [←] key, and at the next display (ANALOGUE OUTPUT), press the [>] key to give:

```
ANALOG OUTPUT
X      >✓<
```

- Again press the [←] key, and at the next display

```
ANALOG OUTPUT
> 0 <
```

press the number key 6, followed by the [↵] key. (Any error in entering the number can be corrected by using the [<] key.)

- At the next display (ENABLE), press the [>] key to give:

```
ENABLE
X      >✓<
```

then press the [↵] key.

- The next display shows the FUNCTION to be used for the analog output on this channel. Press the [A] key to select rms current, and give the following display:

```
FUNCTION
> Arms <
```

- Again press the [↵] key.
- At the next display (CHANNEL), press the number key 3

```
CHANNEL
> 3 <
```

followed by the [↵] key. (Again any error in entering the number can be corrected by using the [<] key.)

The next two displays show MINIMUM VALUE and MAXIMUM VALUE. These refer to the currents (in this case) for which the analog output will be 0Volts and 5Volts respectively. Currents in between these maximum and minimum values will give output voltages in proportion; currents below or above the range will cause output voltages at 0V and 5V respectively. The range to be entered is 0 to 10Arms.

- Using the number keys (and the [<] key to correct any errors), obtain the following displays:

MINIMUM VALUE
> +0 <

(press the [↵] key) and:

MAXIMUM VALUE
> +10 <

- Press the [↵] key, and at the FINISHED display, press the [>] key to give:

FINISHED
X >✓<

- Press the [↵] key to return to the SELECT MENU display.

Finally press the MENU key to return to the measurement display.

Activating the Analog Output

- With the PM300 now making measurements, press the [↵] key again.

The PM300 will now continue to take measurements, and as each result is obtained, the voltage output driving the chart recorder will track the measured current.

The front panel display will also show the analog output in the form of a marker in a horizontal scale representing the range 0 to 5 Volts. If more than one analog output is active, then the display for PM300 Analyzers with early versions of firmware will scroll round showing each output in turn. For firmware versions 1.11 and above, the [<] and [>] keys should be used to select which output is displayed.

The response time from a change in the voltage or current input signal being measured, to that change appearing on the analog output, is about 500msec if the measured parameter is a simple rms quantity such as Vrms, Arms or W. It may be larger (up to 30 seconds) when measuring harmonics and/or THD.

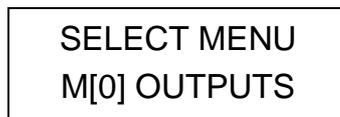
- To turn off the analog output at the end of the recording session, press the [PROG] key.

CHAPTER 5

MENU SUMMARY

The menu summary is shown below as a series of flow-charts in which the following symbols are used:

- Text in a large box with a solid border



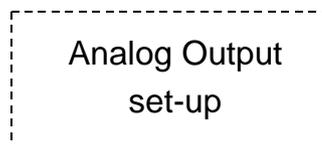
refers to the display seen on the front panel.

- Text in a small box with a solid border



refers to pressing a front panel key.

- Text in a large box with a dotted border



refers to a whole series of displays and front-panel key presses, shown in detail on a following page.

- The symbol

Select Function

refers to pressing one or more keys to enter the required measurement function:

one key: [V], [A], [W], [VA], [VAr], [PF] or [FREQ]

two keys: { [V] or [A] } then { [PEAK] or [THD] }
{ [V], [A], [W], [VA], [VAr] or [PF] } then [FUND]

or a sequence: { [V], [A] or [W] }, [HARM] then { numbers }

Any errors made when entering the required function can be corrected by using the [<] key to start again.

- The symbol

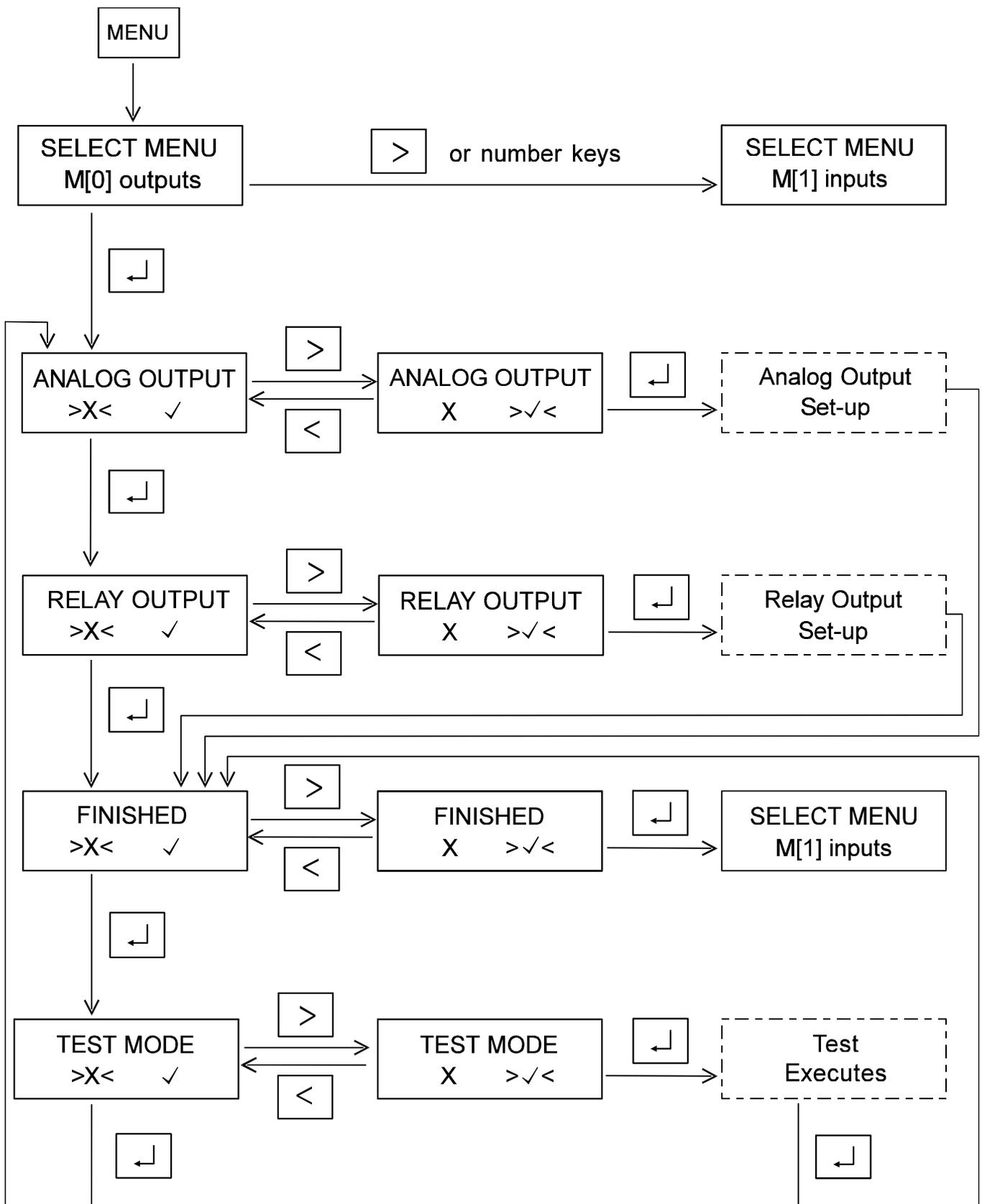
4½ Digit Number

refers to pressing one or more number keys to enter the required number.

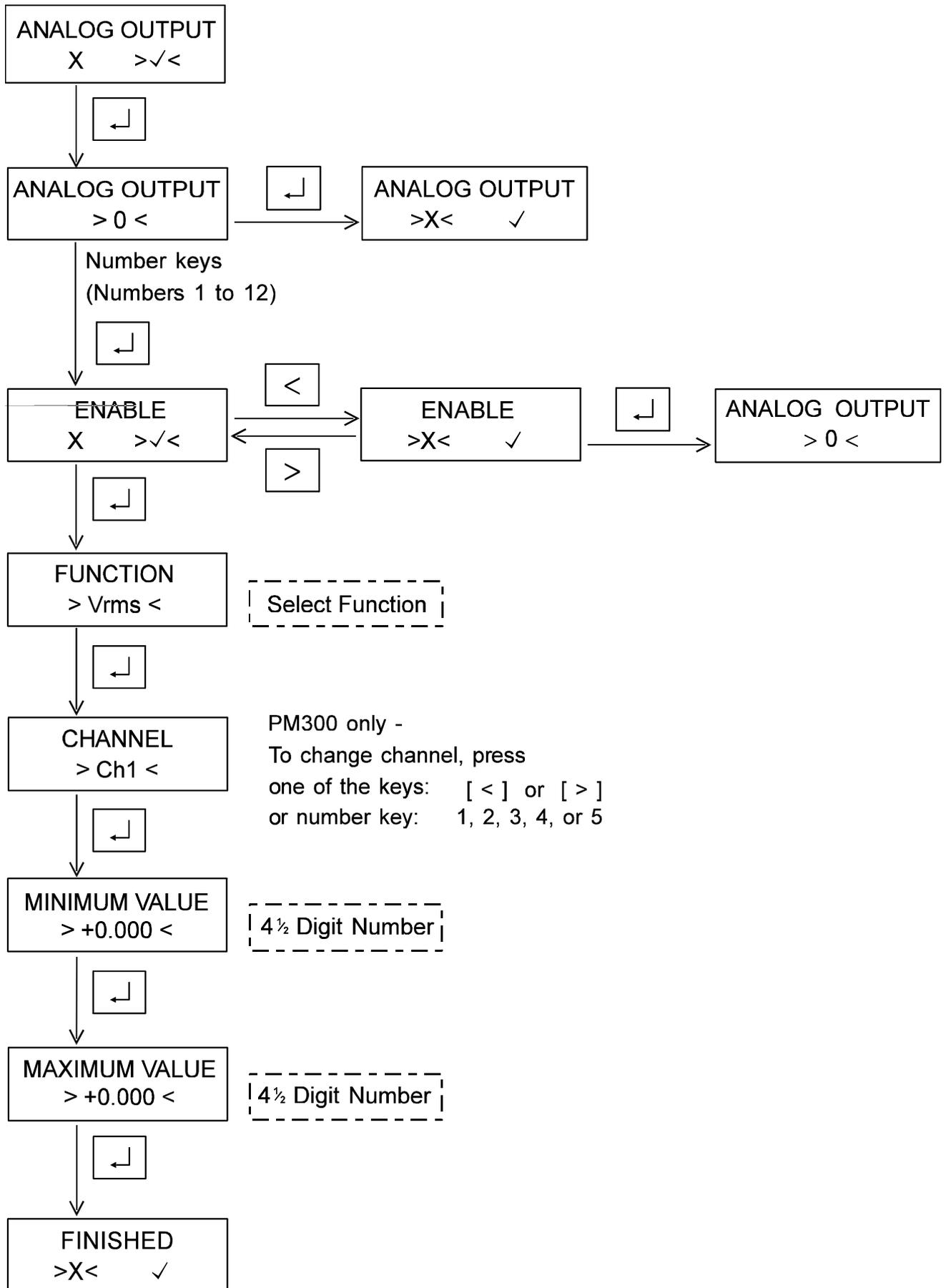
The numbers may contain up to 4½ significant figures (ie numbers with digits from 0000 to 19999), plus decimal point and k or M multiplier. The [>] key may be used to toggle the polarity.

Any errors made when entering the required function can be corrected by using the [<] key to start again.

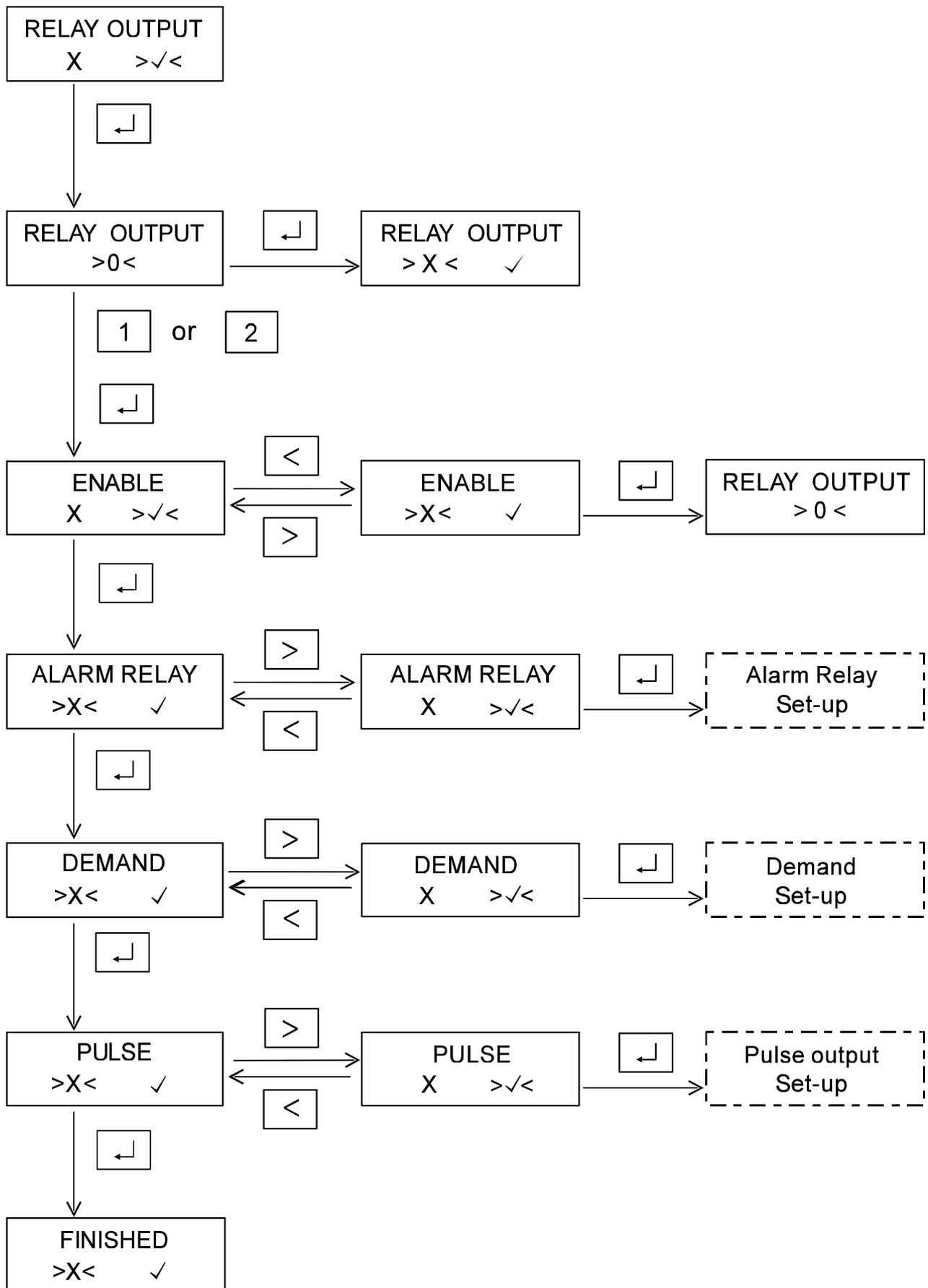
5.1 Top-Level Summary



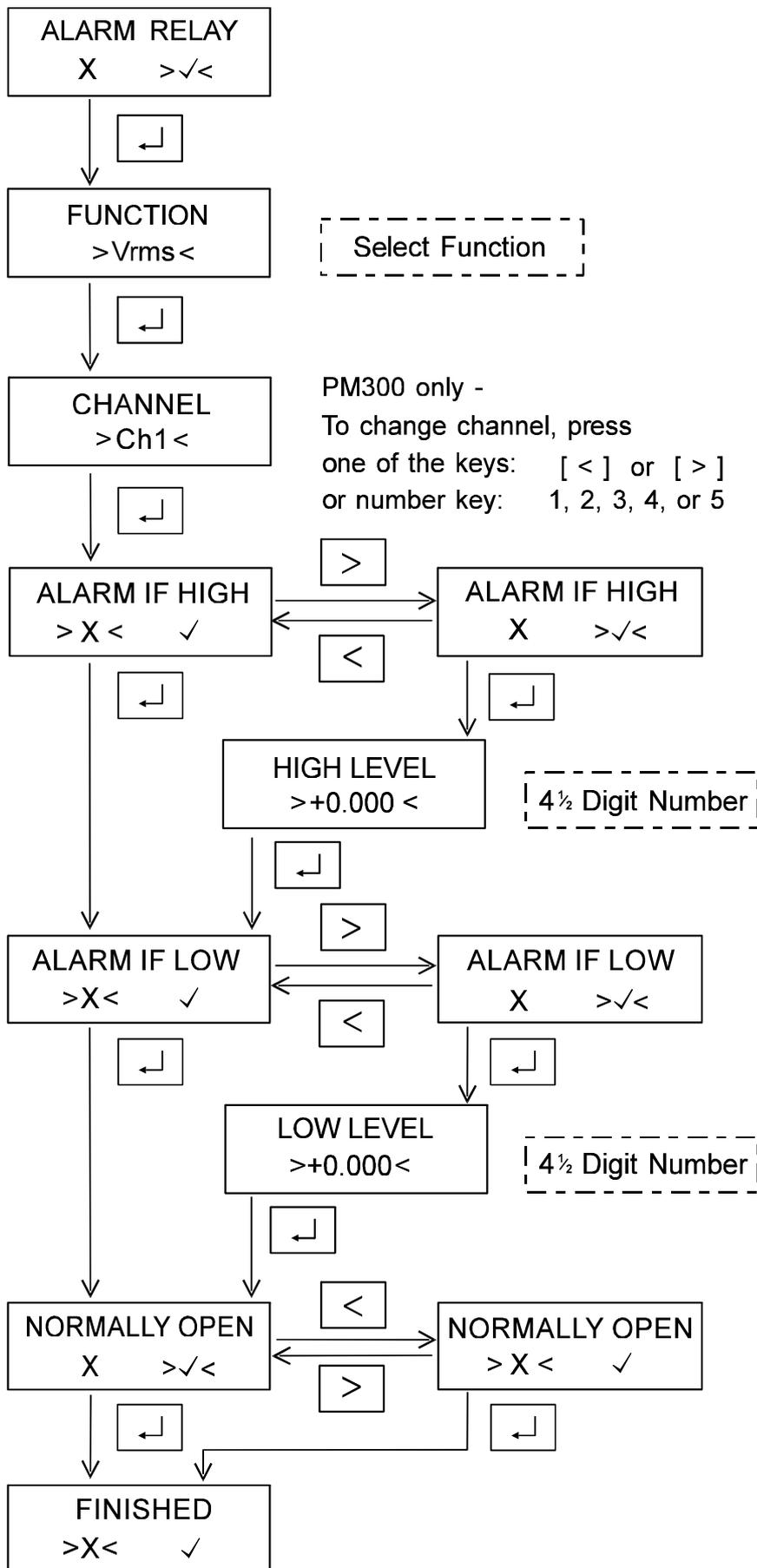
5.2 Analog Output Set-up



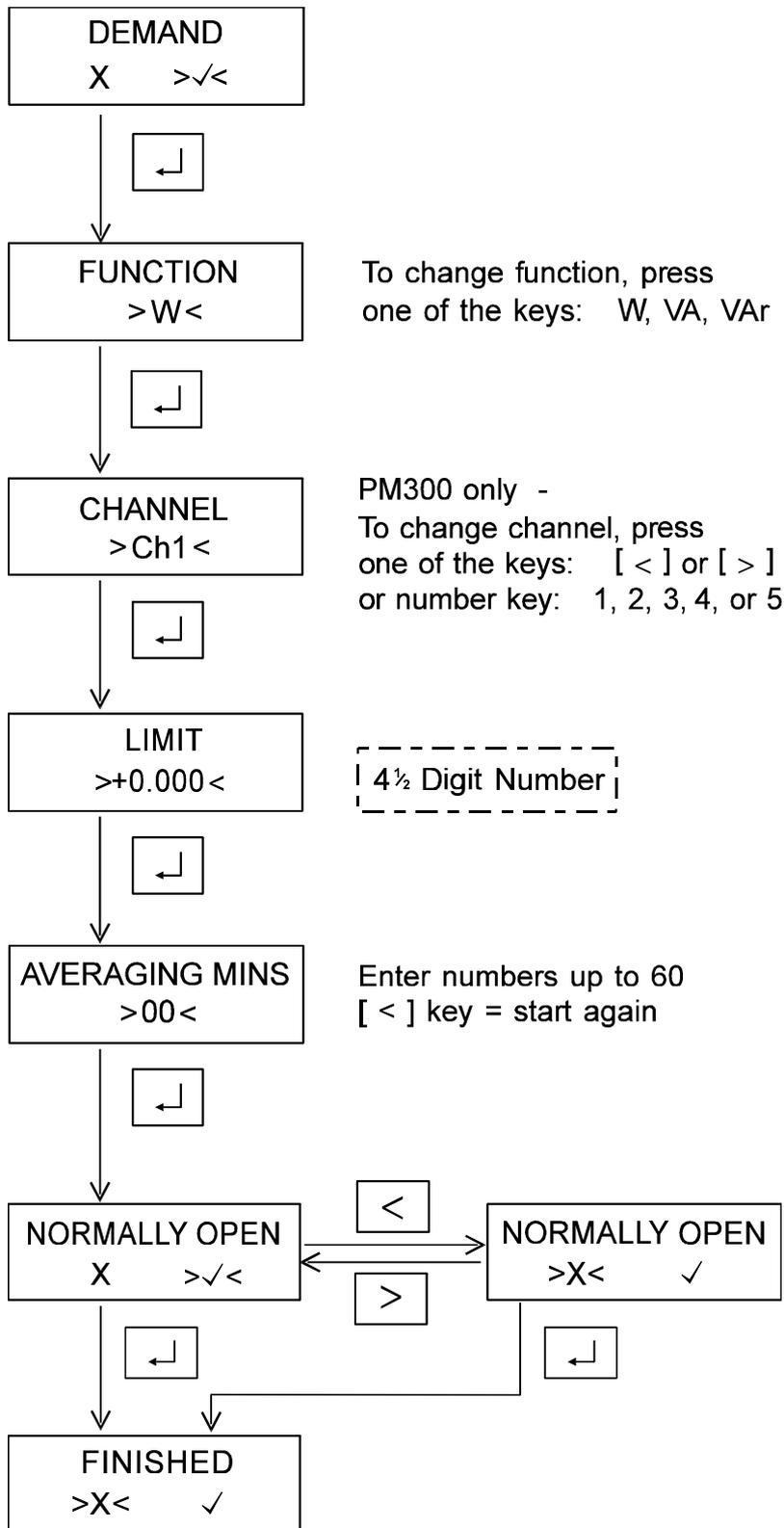
5.3 Relay Output set-up



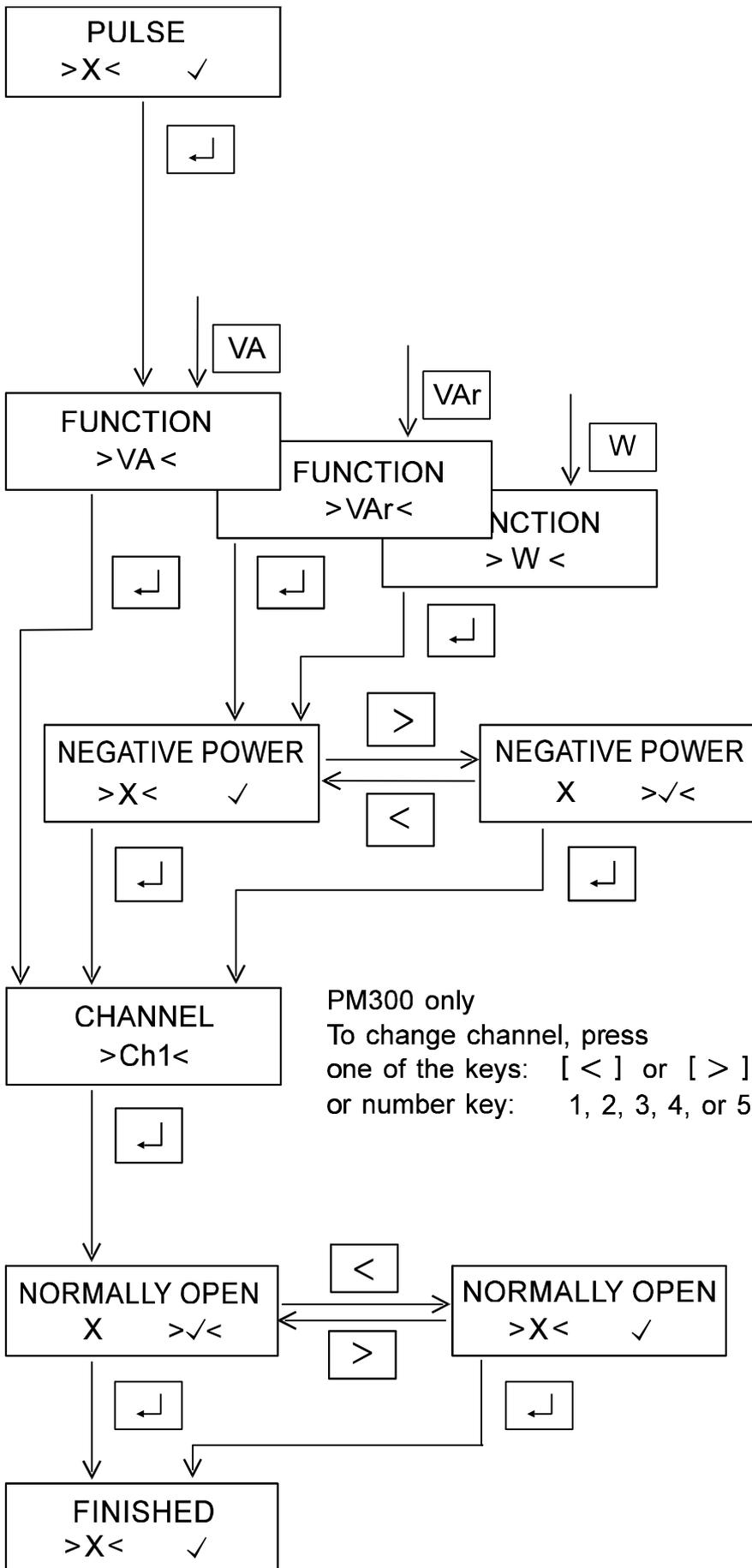
Alarm Relay Set-up



Demand Set-up



Pulse Output Set-up



Post Sale Warranty

This Voltech product is warranted against defects in materials and workmanship for a period of twelve (12) months from the date of shipment.

In the event of failure of a customer unit during this period, Voltech will:

- (i) For a unit returned to an authorized service center, at Voltech's discretion, repair or replace the faulty unit free-of-charge. (Shipment from the customer address will be the responsibility of the customer.)

Voltech reserve the right to waive this benefit in any event where it is clear, upon inspection, that the cause of the failure is due to customer misuse, unauthorized modifications or operation outside the specification of the product.

Voltech will be the sole arbiter in this circumstance.

- (ii) For the United Kingdom only, pay all return shipment charges from the Voltech service center to the customer.
- (iii) Re-calibrate the customer unit before dispatch. A certificate of calibration will be issued as a matter of course.

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