

# A210 series Multifunction Power Monitor Programming Guide

## Safety notes

The installation and commissioning should only be carried out by trained personnel.

Check the following points before commissioning:

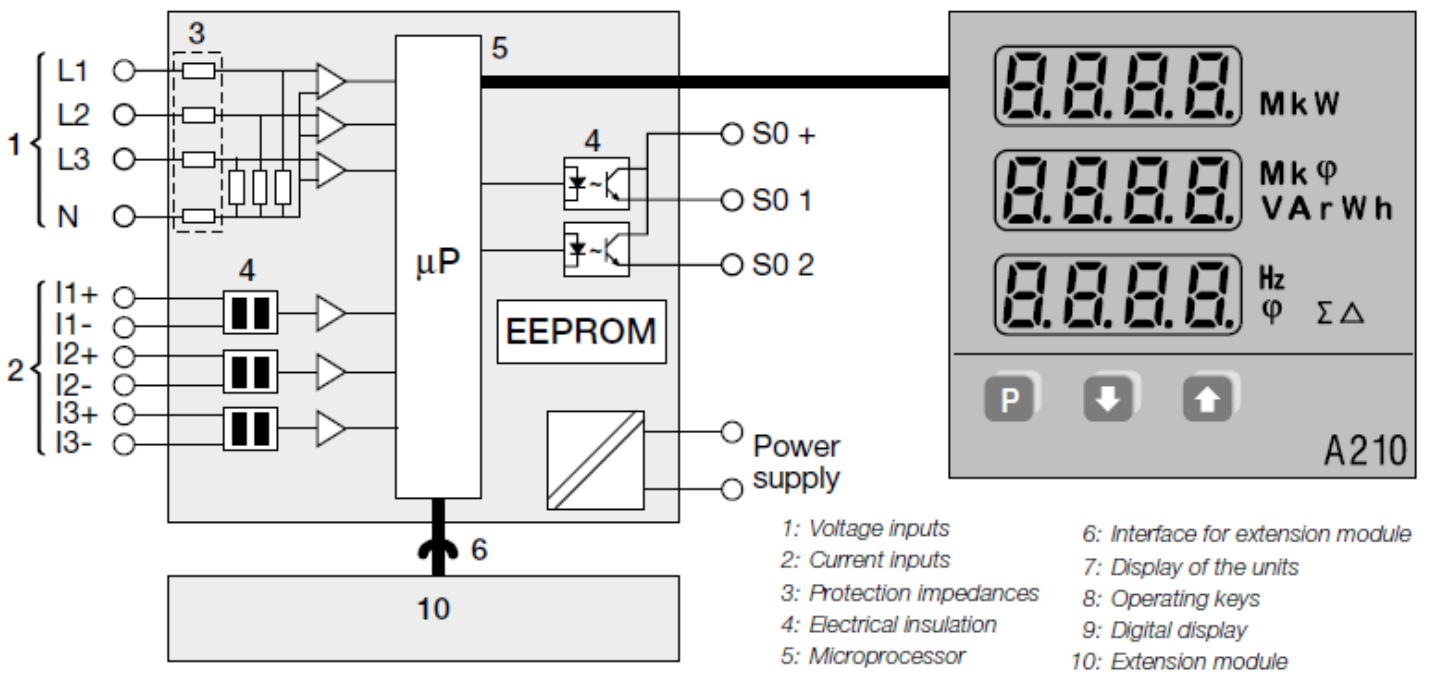
- that the maximum values for all the connections are not exceeded, see the "Technical data" section,
- that the connection wires are not damaged, and that they are not live during wiring,
- that the power flow direction, and the phase rotation are correct.

The instrument must be taken out of service if safe operation is no longer possible (e.g. visible damage). In this case, all the connections must be switched off. The instrument must be returned to the factory or to an authorized service dealer.

It is forbidden to open the housing and to make modifications to the instrument. The instrument is not equipped with an integrated circuit breaker. During installation check that a labeled switch is installed and that it can easily be reached by the operators.

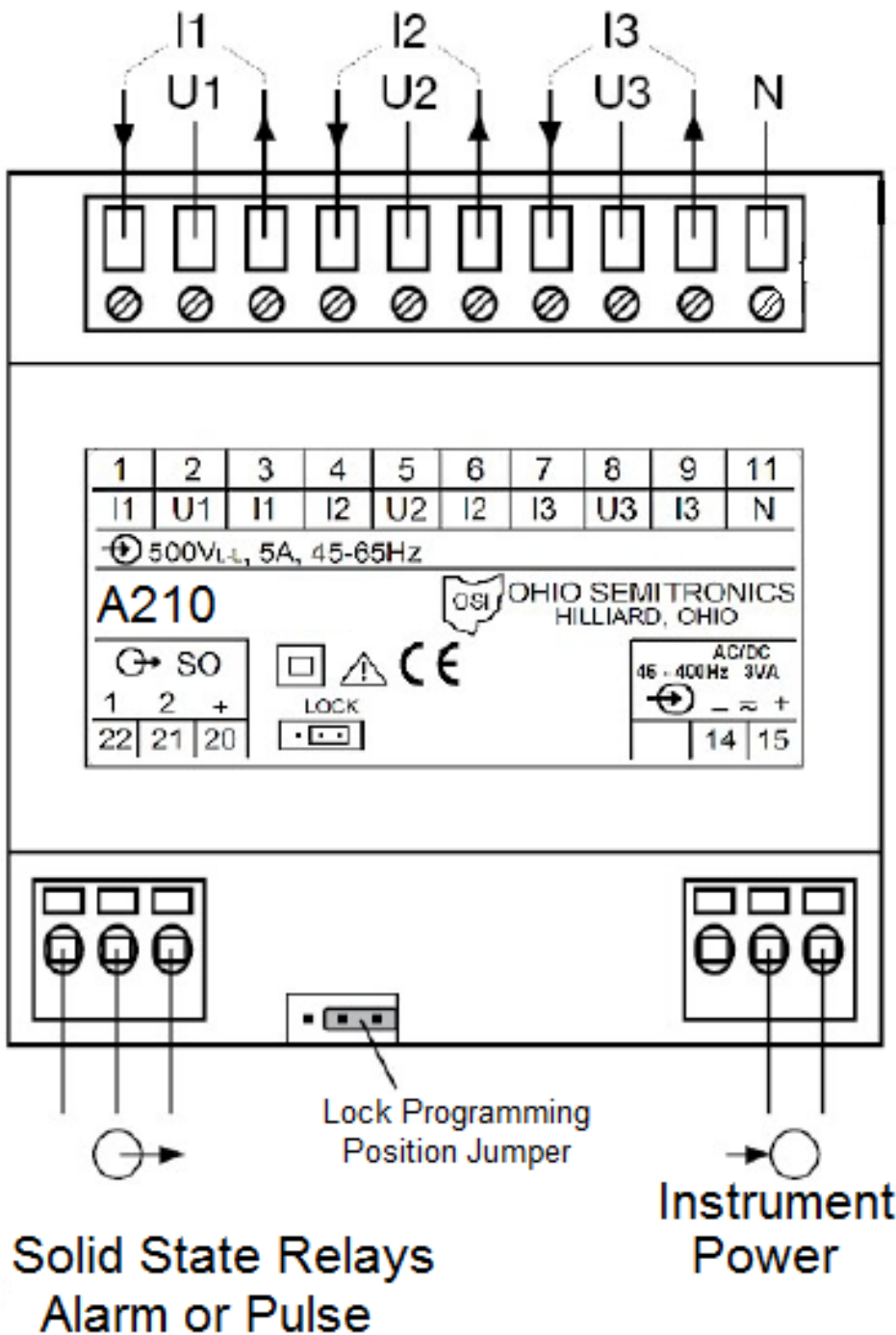
Unauthorized repair or alteration of the unit invalidates the warranty.

## Overview of Inputs/outputs/Display




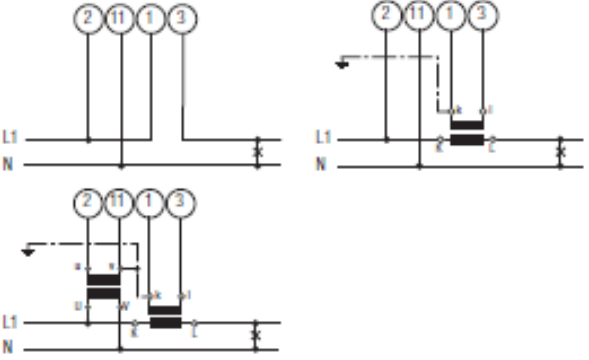

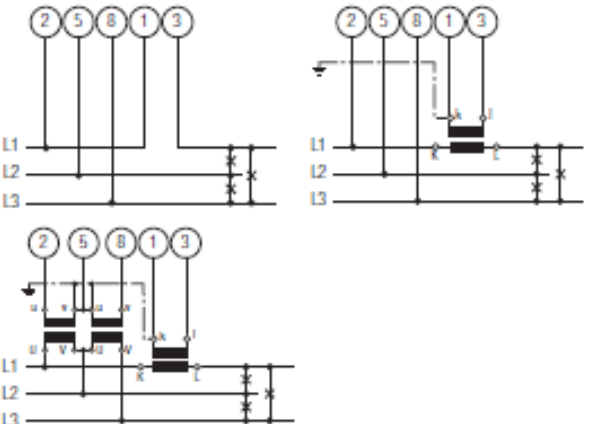

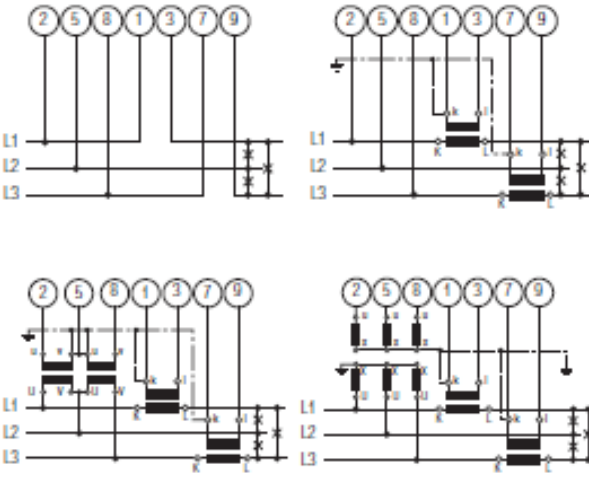
Note: MM/COM series extension module options and software provided separately (#10 above).

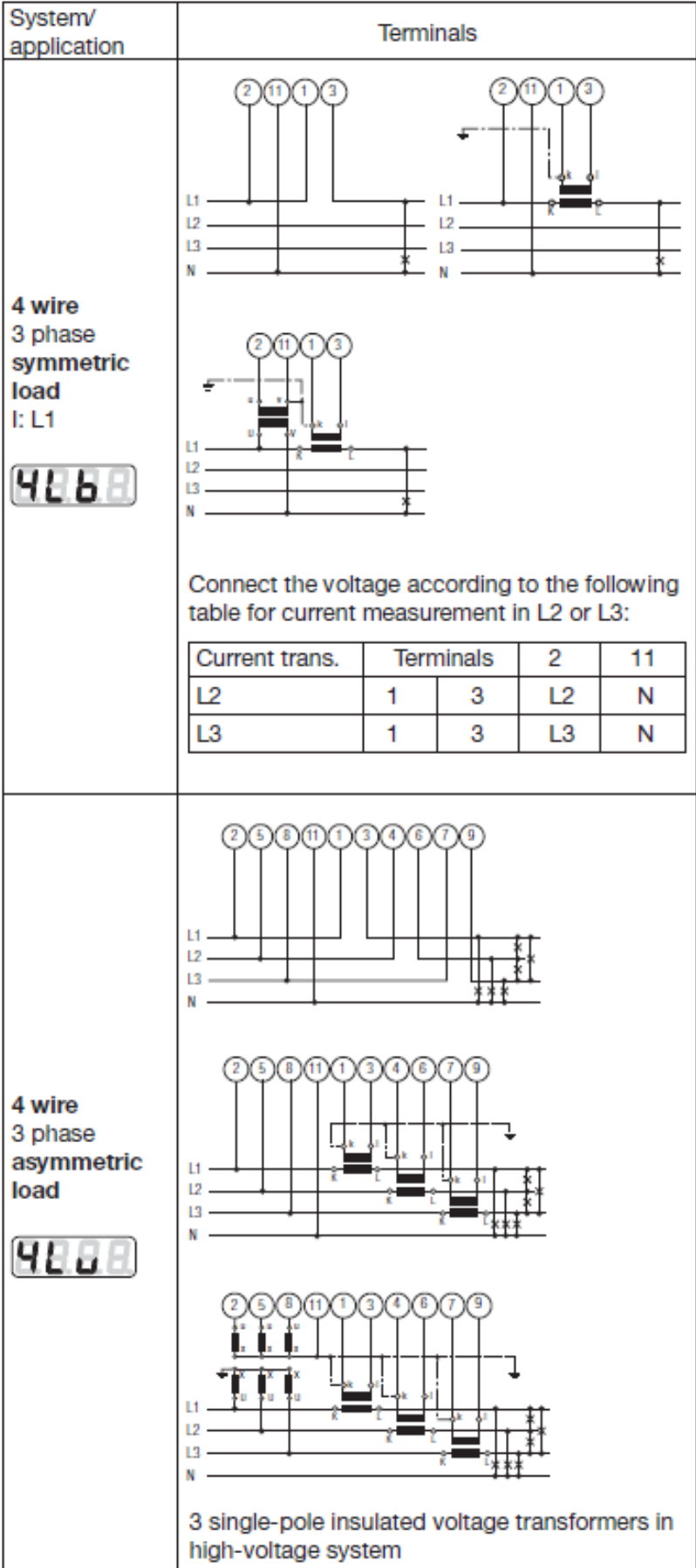
## → Measuring Inputs



Available models:

- A210-001** with 5A nominal input with Instrument power range 85-253Vac (45-400Hz) or dc.
- A210-002** with 5A nominal input with Instrument power range 20-70Vac (45-400Hz) or dc.
- A210-003** with 1A nominal input with Instrument power range 85-253Vac (45-400Hz) or dc.
- A210-004** with 1A nominal input with Instrument power range 20-70Vac (45-400Hz) or dc.

System/ application	Terminals																	
<p><b>Single phase AC system</b></p> 																		
<p><b>3 wire 3 phase symmetric load</b></p> <p>I: L1</p> 	 <p>Connect the voltage according to the following table for current measurement in L2 or L3:</p> <table border="1" data-bbox="917 1207 1485 1375"> <thead> <tr> <th>Current transf.</th> <th>Terminals</th> <th>2</th> <th>5</th> <th>8</th> </tr> </thead> <tbody> <tr> <td>L2</td> <td>1</td> <td>3</td> <td>L2</td> <td>L3</td> <td>L1</td> </tr> <tr> <td>L3</td> <td>1</td> <td>3</td> <td>L3</td> <td>L1</td> <td>L2</td> </tr> </tbody> </table>	Current transf.	Terminals	2	5	8	L2	1	3	L2	L3	L1	L3	1	3	L3	L1	L2
Current transf.	Terminals	2	5	8														
L2	1	3	L2	L3	L1													
L3	1	3	L3	L1	L2													
<p><b>3 wire 3 phase asymmetric load</b></p> 																		



## Programming

All parameters may be displayed at any time. For modifications the jumper on the backside of the device must be removed (not on position LOCK).

The following table shows all parameters with their adjustable ranges or possible selections respectively. The black numbers give a cross-reference to the appropriate diagram position listed later.

Starting at the measurands display by pressing the key **(P)** you may change to the menu level.

Afterwards you can select the desired menu item by pressing the key **(P)** shortly.

Use **↓** to enter the level where the desired parameter is displayed.

Pressing **(P)** shortly will force the selectable element to flash.

The flashing content may be modified using the keys **↓** or **↑**.

Press **(P)** for a longer time to leave the parameter or menu level.

All settings will remain non-volatile stored even in case of power-fail.

## Hints:

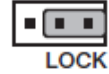
First you have to set the system configuration and the transformer ratios because further measurand selections, alarm limit settings etc. will depend on them.

The programming may be modified via an optional extension module as well.

## Locking the configuration

Place the jumper in the LOCK position.

The configuration of all parameters is disabled.

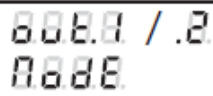







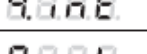






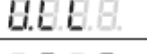
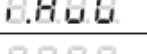


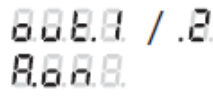

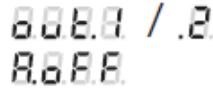
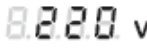


## Factory Default










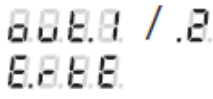

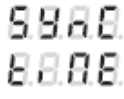

Brightness:	(mid setting)
Limit value / S01:	Off
Limit value / S02:	Off
Transformer ratio:	1 : 1
Jumper:	Not in the LOCK position
Connecting mode:	4 wire asymmetric load
Synchronizing interval:	15 min.

## Program Sequencing (via 3 front-panel buttons):

No.	Topmost display Middle display	Undermost display (Selection, * = Default)	Meaning	Hints
<b>1</b>			System configuration	
		*	4-line system, unbalanced load	(4 lines unbalanced)
			3-line system, unbalanced load	(3 lines unbalanced)
			4-line system, balanced load	(4 lines balanced)
			3-line system, balanced load	(3 lines balanced)
			Single-line system	(1 line)
<b>2</b>			Load type for energy recovery: Mathematical	4 quadrant display, ind-cap-ind-cap
			Load type for energy recovery: Electrical	4 quadrant display, ind-ind-cap-cap
<b>3</b>		$0.500 \text{ kV}^*$ 100 V to 999 kV	Primary voltage of an external transformer on the voltage (line-to-line voltage)	First you enter any 3-digit number followed by the appropriate power unit selection in steps of factor 10
<b>4</b>		$0.500 \text{ V}^*$ 100 V to 999 V	Secondary voltage of an external transformer on the voltage input (line-to-line voltage)	
<b>5</b>		$0.500 \text{ A}^*$ 1.00 A to 999 kA	Primary current of an external transformer on the current input	
<b>6</b>		$0.500 \text{ A}^*$ 0.1 A to 9,99 A	Secondary current of an external transformer on the current input	






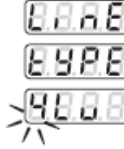


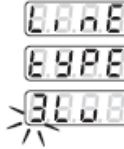
No.	Topmost display Middle display	Undermost display (Selection, * = default)	Meaning	Hints		
<b>7</b>			Operating mode of both digital outputs "out.1" and "out.2"	(mode)		
			Output switched-off	Simulation via interface module is still possible		
			Energy pulse output	The output generates energy pulses depending on the rate set under <b>12</b> . The meter measurands to output may be selected under <b>11</b> .		
			Alarm output	If the alarm limit <b>9</b> is exceeded the output will be active (current flows). If the measurand is below limit <b>10</b> the output will be passive. The source of the monitored is selected under <b>8</b> .		
<b>8</b>			Alarm supervision source	This selection is presented only if operating mode <b>7</b> is set to ALM previously		
				Line Type		
				'1L', '3Lb', '4Lb'	'3Lu'	'4Lu'
			Frequency	●	●	●
			Neutral current			●
			Apparent power interval	●	●	●
			Reactive power interval	●	●	●
			Active power interval	●	●	●
			Power factor (cos φ)	●	●	○
			Apparent power	●	●	○
			Reactive power	●	●	○
			Active power	●	●	○
			Voltage	●		
			Line-neutral voltage			○
			Line-to-line voltage		○	○
			Average current (bimetal)	●	○	○
	Phase current	●	○	○		
			○: 'A.on'= OR-operation of line-measurands 'A.off'= AND-operation of line-measurands			
<b>9</b>			Alarm limit for ON-state	The maximum values of the alarm limits depend on the possible measuring range (fixed by hardware), converted into possible primary values given by the selected system configuration and transformation ratios.		
<b>10</b>			Alarm limit for OFF-state			






No.	Topmost display Middle display	Undermost display (Selection, * = default)	Meaning	Hints
11			Source of energy meters for pulse output	
			Reactive energy capacitive, low tariff	
			Reactive energy capacitive, high tariff	
			Reactive energy inductive, low tariff	
			Reactive energy inductive, high tariff	
			Active energy outgoing, low tariff	(outgoing low tariff)
			Active energy outgoing, high tariff	(outgoing high tariff)
			Active energy incoming, low tariff	(incoming low tariff)
	Active energy incoming, high tariff	(incoming high tariff)		
12		 Mk* Wh 1 to 5000 / Wh to GWh	Number of pulses per displayed energy unit. After entering a number from 1 to 5000 you may input the scaling: Basic unit (-), kilo (k), Mega (M) or Giga (Mk)	(energy rate)
13		 * 1 to 60 min.	Time interval in minutes for the calculation of power intervals 0 = Interval controlled via the bus	For external synchronization, the value displayed is not relevant





### Examples

Example 1: Programming the system configuration  
(3-line, unbalanced load)

- Press  > 2 s  

- Press  (present setting is displayed)  

- Press  (alterable parameter flashes)  

- Press  /  to select desired setting  


- Press  (takes over new setting).  
Display stops flashing.  

- Press  > 2 s to return to display level

Example 2: Programming voltage transformer ratio and synchronization interval

- Press  > 2 s  

- Press  (transformer ratio menu)  


3. Press (present setting of primary voltage)

4. Press (leftmost digit flashes)

5. Press / until desired number appears

6. Press (middle digit flashes)

7. Press / until desired number appears

8. Press (rightmost digit flashes)

9. Press / until desired number appears

10. Press (decimal point flashes)

11. Press / until the decimal point is on the desired position and the kilo/Mega display is correct

12. Press (takes over new value).  
The display stops flashing

13. Press (present setting of secondary voltage)

14. Programming procedure same as for primary voltage (1 to 12)

15. Press until the topmost display

as shown

16. Press three times

17. Press (present setting of synchronization interval in minutes)

18. Press (left digit flashes)

19. Press / until desired number appears

20. Press (right digit flashes)

21. Press / until desired number appears

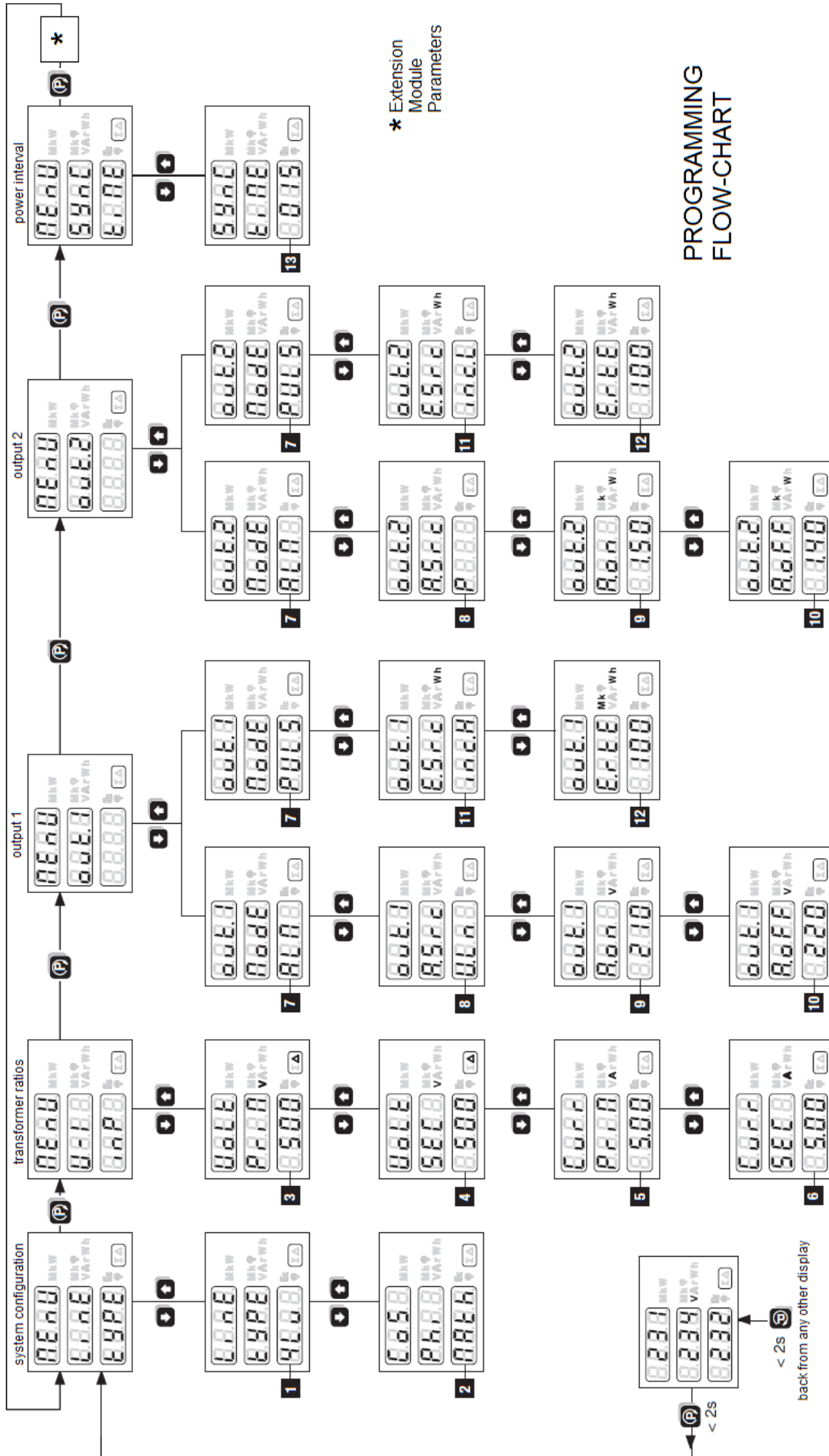
22. Press (takes over new value).  
The display stops flashing

23. Press > 2 s (return to display level)

### Brief operating instruction for parameter modification

1. On the parameter level press key
2. Adjustable 7-segment display flashes
3. Use or to set the flashing content.  
Adjustable values see **1** to **13** in the parameter overview. All values shown are default values
4. Press key .  
If there is still a flashing 7-segment digit , decimal point or unit : Back to 3.
5. Change to the next parameter by pressing or and go back to 2. or  
go back to menu level with and go on with 1.  
Return to measurands display:  
Press for more than 2 seconds.





\* Extension Module Parameters

## PROGRAMMING FLOW-CHART

## Display Indicator Symbols and start-up sequence:

The measurement display is 3 digit resp. 4 digit (frequency) and right justified, with the exception of the energy values which are 8 digits. The left-hand 7-segment display is for the sign or an abbreviation.

Abbreviations:

	Maximal value
	Minimal value
	Average value
	Max. average value
	Minimal value for power factor; the worst out of the 3 values of P1, P2, or P3 is displayed
	Neutral current
	Inductive
	Capacitive
	Incoming
	Outgoing
	Interval active power
	Interval reactive power
	Interval apparent power
	Last interval; t-0
	Previous interval; t-1, -2, -3, -4
	Overload, out of range indicator
$\Sigma$	System value
$\Delta$	Delta voltage
$.H$	High tariff
$.L$	Low tariff

Energy meter

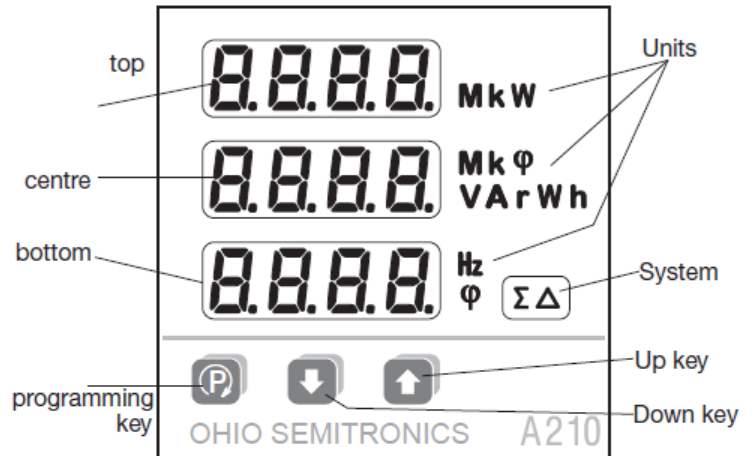
Interval 0	Interval 1	Interval 2	Interval 3	Interval 4
------------	------------	------------	------------	------------

Current time t	t-0	t-1	t-2	t-3	t-4
----------------	-----	-----	-----	-----	-----

### Zero value suppression

PF resp.  $\cos\phi$ : Display ---, if  $S_x < 0.2\% S_{nenn}$

Currents: Display 0, if  $I_x < 0.1\% I_{nenn}$



### Commissioning

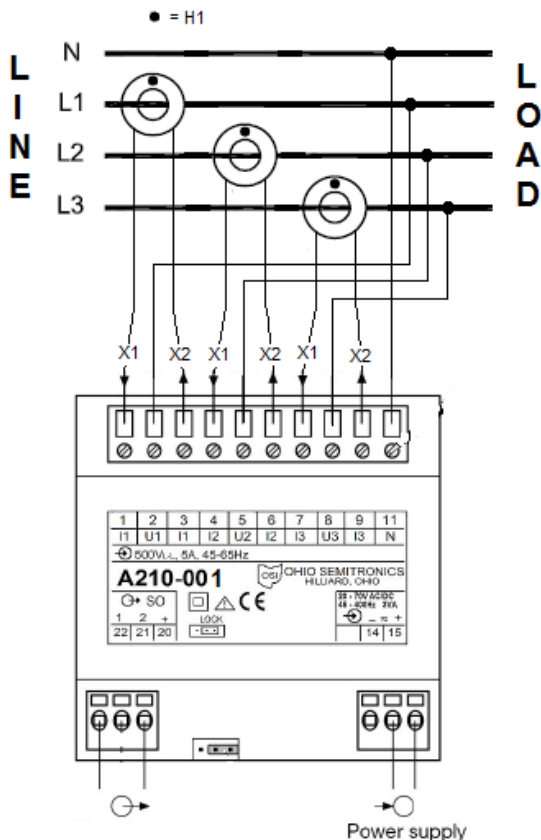
The multi-functional power monitor is made operational by switching on the power supply. The following appears sequentially on the display:

1. Segment tests: all the segments of the displays and all the LEDs are lit for 2 s.
2. Version of the software: e.g. A210 1.04
3. The 3 line voltages at switching on.

### Loss of the power supply

All the values configured remain during a loss of the power supply. On reconnecting the power supply, the last mode selected is displayed.

## Typical Current Transformer markings (3 phase 4 wire configuration shown):



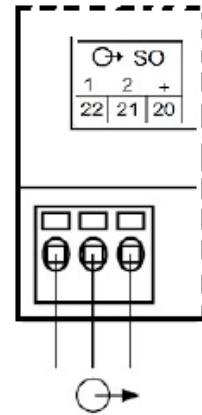
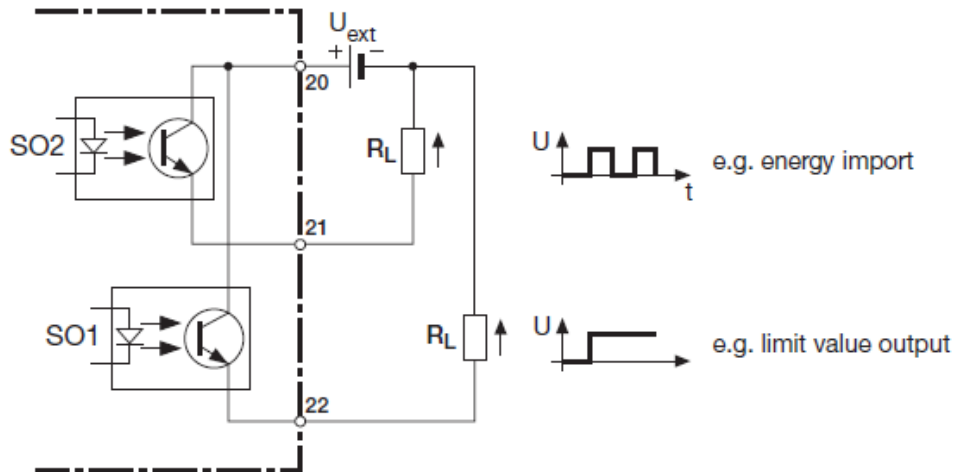
## Two Relay Outputs: Use for an Alarm Limit or set for Watt-Hour Pulse:

Depending on the function selected, the two digital outputs can be used either as pulse outputs for active and reactive energy or as limit signals.

The outputs are passive, and are galvanically isolated from all the other circuits by opto-couplers. They are suitable to drive tariff devices (S0-standard DIN 43 864) or 24 V-relais.

$U_{ext} \leq 40 \text{ V DC}$  (OFF: leakage current  $\leq 0.1 \text{ mA}$ )

$I_L \leq 150 \text{ mA}$  (ON: terminal voltage  $\leq 1.2 \text{ V}$ )



### Limit value outputs

Any measured value can be allocated to the limit values.

### Impulse outputs

Active and reactive energy impulses can be generated for driving electronic and electromechanical energy meters.

See Standard A210 specification sheet for additional technical information.

MM/COM extension plug-in modules are available in three option models and have separate specification documents and free *A200plus* software available.

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Cory Forler 7-21-16 rev –