



Hook-up Checklist for the Ranger PM3000 (USA)

Step 1. Establish type of installation (e.g. no. of phases).

Step 2. Establish type of transducers (PTs, CTs etc.).

Step 3. Choose one of the ten following hook-up options:

- 1) 3-Phase 4-Wire Wye
- 2) 3-Phase 4-Wire Delta
- 3) 3-Phase 3-Wire 3P-P (3 element for all phase-phase)
- 4) 3-Phase 3-Wire Delta
- 5) 3-Phase 3-Wire Wye
- 6) 3-Phase 2.5-Element Wye
- 7) 3-Phase 1-Element Wye
- 8) 2-Phase 2-Element Wye
- 9) Single Phase
- 10) Uncommitted.

Step 4. Configure instrument for relevant hook-up and transducers.

Step 5. Verify physical connections using instrument touchscreen or PMScreen vector outputs (see pp. 1-10 of these notes).

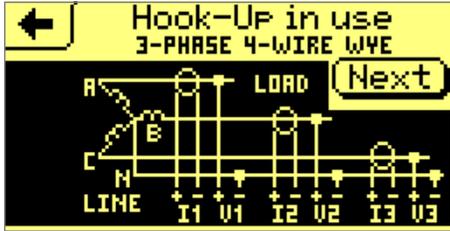
Step 6. If required, refer to Phase Angle Summary (p. 11).

Step 7. If vectors do not match what is expected or you see the "Suspect Hook-Up" message, refer to possible explanations and action to be taken (p. 12).



3-Phase 4-Wire Wye

Hook-up as displayed on the PM3000 touchscreen or PMScreen.



Screenshot from touchscreen or PMScreen

Connections are made using:
 3 Rogowski Coils or clamp on CTs,
 4 Voltage Leads
 with the common Neutral connected
 via 2 link leads (blue or white).

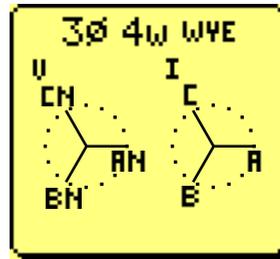


Something not looking right?

See p. 12 for possible solutions.

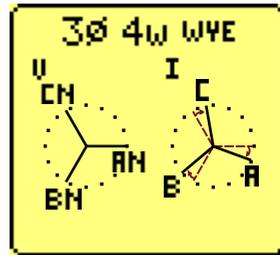
A successful hook-up (based on physical connections and corresponding instrument configuration) is demonstrated via vector outputs as seen on the PM3000 touchscreen or PMScreen.

Unity Power Factor (PF)

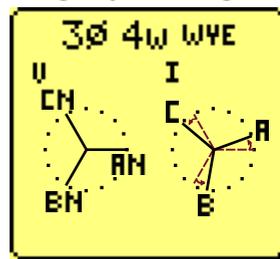


Screenshot from touchscreen or PMScreen

Slightly lagging PF



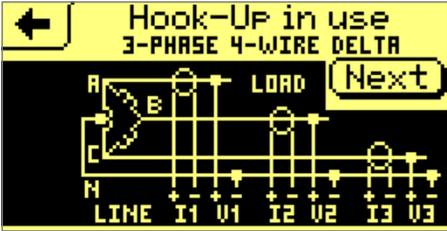
Slightly leading PF



3-Phase 4-Wire Delta

Hook-up as displayed on the PM3000 touchscreen or PMScreen.

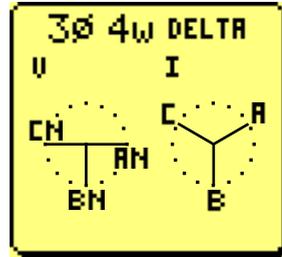
A successful hook-up (based on physical connections and corresponding instrument configuration) is demonstrated via vector outputs as seen on the PM3000 touchscreen or PMScreen.



Screenshot from touchscreen or PMScreen

Connections are made using:
 3 Rogowski Coils or clamp on CTs,
 3 Voltage Leads
 with the common Neutral connected
 via 2 link leads (blue or white).

Unity Power Factor (PF)



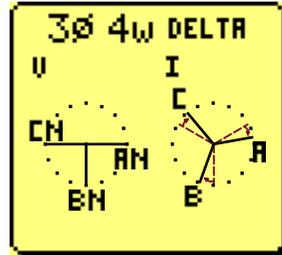
Screenshot from touchscreen or PMScreen



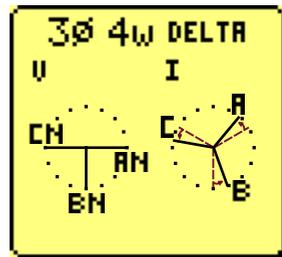
Something not looking right?

See p. 12 for possible solutions.

Slightly lagging PF



Slightly leading PF

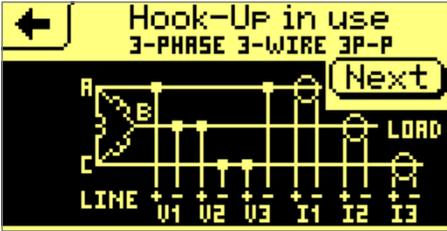


3-Phase 3-Wire 3P-P

(3 element for all phase-phase)

Hook-up as displayed on the PM3000 touchscreen or PMScreen.

A successful hook-up (based on physical connections and corresponding instrument configuration) is demonstrated via vector outputs as seen on the PM3000 touchscreen or PMScreen.

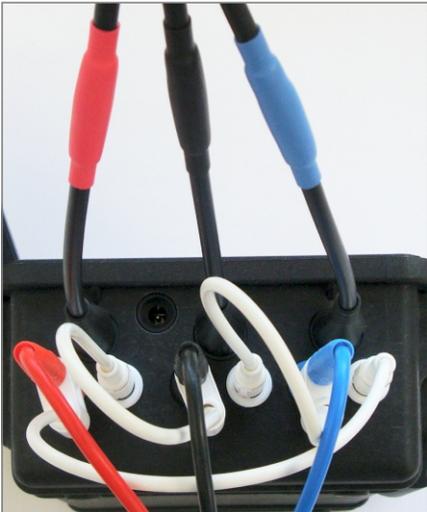


Screenshot from touchscreen or PMScreen

Connections are made using:

- 3 Rogowski Coils or clamp on CTs,
- 3 Voltage Leads

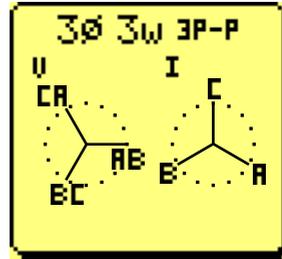
with 3 link leads (blue or white) connecting the return through each of the 3 phases.



Something not looking right?

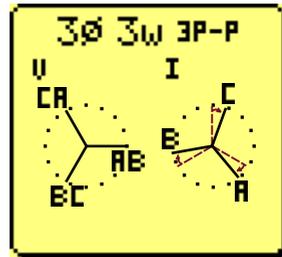
See p. 12 for possible solutions.

Unity Power Factor (PF)

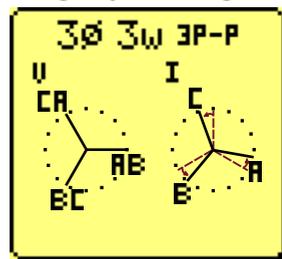


Screenshot from touchscreen or PMScreen

Slightly lagging PF



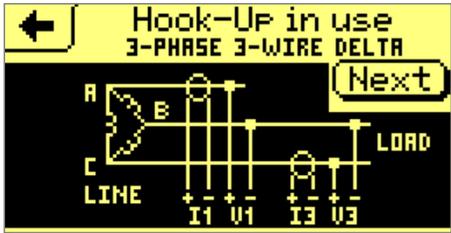
Slightly leading PF



3-Phase 3-Wire Delta

Hook-up as displayed on the PM3000 touchscreen or PMScreen.

A successful hook-up (based on physical connections and corresponding instrument configuration) is demonstrated via vector outputs as seen on the PM3000 touchscreen or PMScreen.



Screenshot from touchscreen or PMScreen

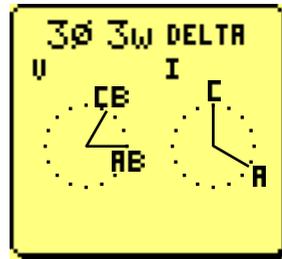
Connections are made using:
 2 Rogowski Coils or clamp on CTs,
 3 Voltage Leads
 with the return along the B phase
 connected via 1 link lead (blue or white).



Something not looking right?

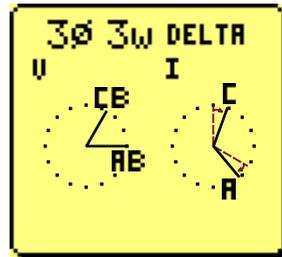
See p. 12 for possible solutions.

Unity Power Factor (PF)

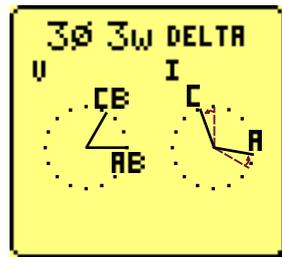


Screenshot from touchscreen or PMScreen

Slightly lagging PF



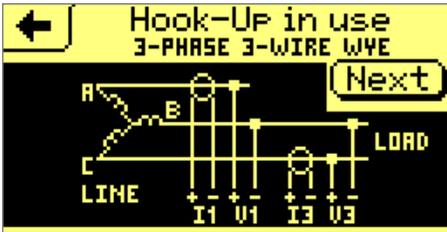
Slightly leading PF



3-Phase 3-Wire Wye

Hook-up as displayed on the PM3000 touchscreen or PMScreen.

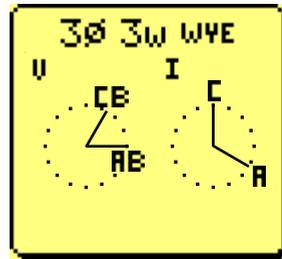
A successful hook-up (based on physical connections and corresponding instrument configuration) is demonstrated via vector outputs as seen on the PM3000 touchscreen or PMScreen.



Screenshot from touchscreen or PMScreen

Connections are made using:
2 Rogowski Coils or clamp on CTs,
3 Voltage Leads
with the return along the B phase
connected via 1 link lead (blue or white).

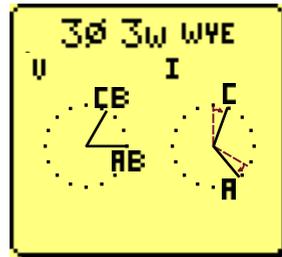
Unity Power Factor (PF)



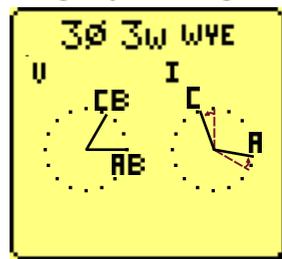
Screenshot from touchscreen or PMScreen



Slightly lagging PF



Slightly leading PF



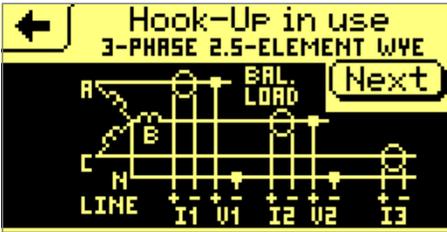
Something not looking right?

See p. 12 for possible solutions.

3-Phase 2.5-Element Wye

Hook-up as displayed on the PM3000 touchscreen or PMScreen.

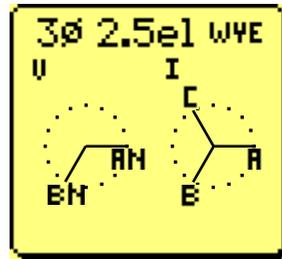
A successful hook-up (based on physical connections and corresponding instrument configuration) is demonstrated via vector outputs as seen on the PM3000 touchscreen or PMScreen.



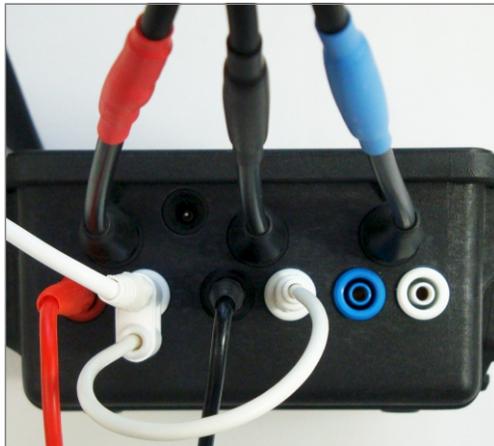
Screenshot from touchscreen or PMScreen

Connections are made using:
3 Rogowski Coils or clamp on CTs,
3 Voltage Leads
with the common Neutral connected
via 1 link lead (blue or white).

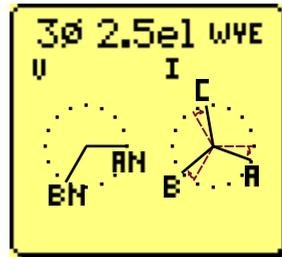
Unity Power Factor (PF)



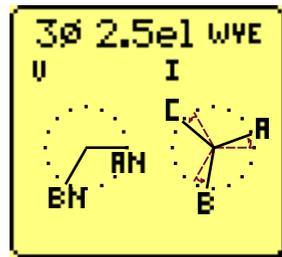
Screenshot from touchscreen or PMScreen



Slightly lagging PF



Slightly leading PF

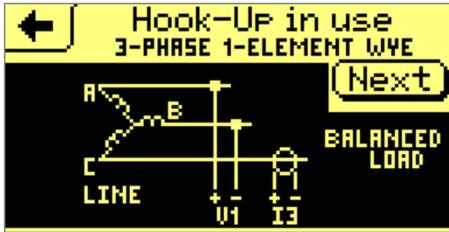


Something not looking right?

See p. 12 for possible solutions.

3-Phase 1-Element Wye

Hook-up as displayed on the PM3000 touchscreen or PMScreen.



Screenshot from touchscreen or PMScreen

Connections are made using:
1 Rogowski Coil or clamp on CT,
2 Voltage Leads
with the return along the B phase

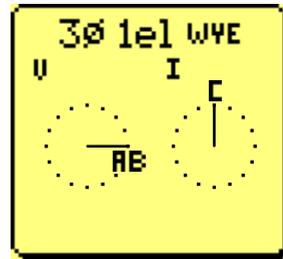


Something not looking right?

See p. 12 for possible solutions.

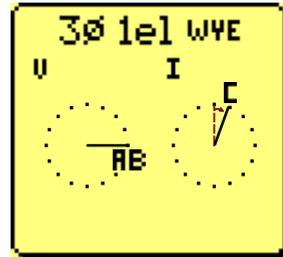
A successful hook-up (based on physical connections and corresponding instrument configuration) is demonstrated via vector outputs as seen on the PM3000 touchscreen or PMScreen.

Unity Power Factor (PF)

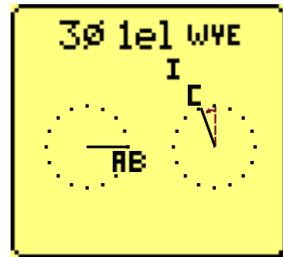


Screenshot from touchscreen or PMScreen

Slightly lagging PF



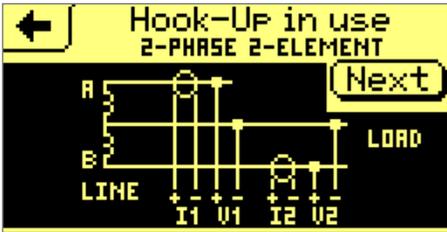
Slightly leading PF



2-Phase 2-Element Wye

Hook-up as displayed on the PM3000 touchscreen or PMScreen.

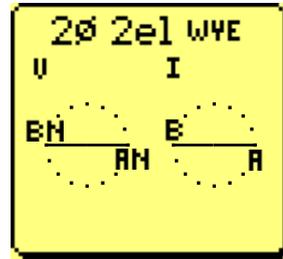
A successful hook-up (based on physical connections and corresponding instrument configuration) is demonstrated via vector outputs as seen on the PM3000 touchscreen or PMScreen.



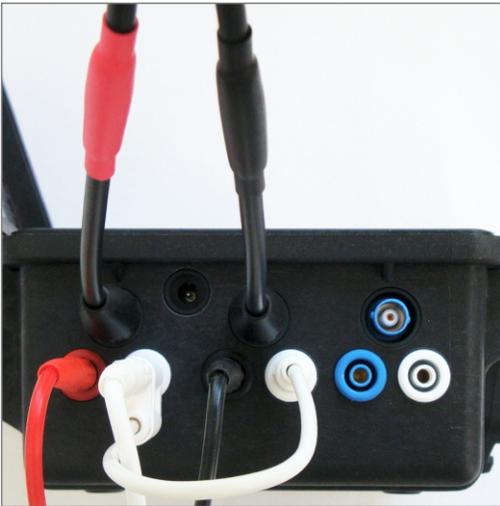
Screenshot from touchscreen or PMScreen

Connections are made using:
 2 Rogowski Coils or clamp on CTs,
 3 Voltage Leads
 with the common Neutral connected
 via 1 link lead (blue or white).

Unity Power Factor (PF)



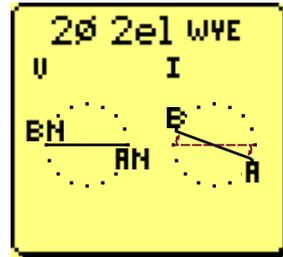
Screenshot from touchscreen or PMScreen



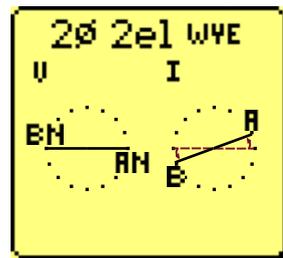
Something not looking right?

See p. 12 for possible solutions.

Slightly lagging PF

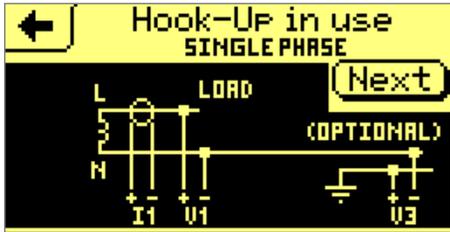


Slightly leading PF



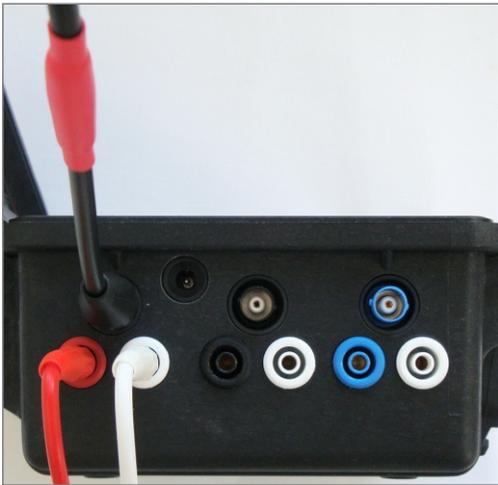
Single Phase

Hook-up as displayed on the PM3000 touchscreen or PMScreen.



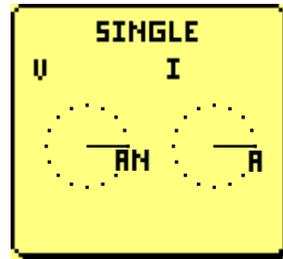
Screenshot from touchscreen or PMScreen

Connections are made using:
1 Rogowski Coil or clamp on CT,
2 Voltage Leads.



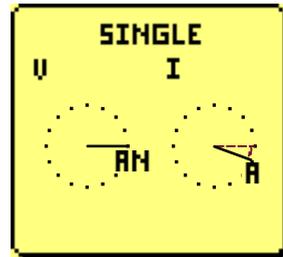
A successful hook-up (based on physical connections and corresponding instrument configuration) is demonstrated via vector outputs as seen on the PM3000 touchscreen or PMScreen.

Unity Power Factor (PF)

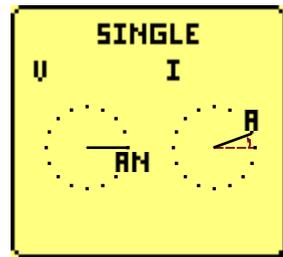


Screenshot from touchscreen or PMScreen

Slightly lagging PF



Slightly leading PF



Something not looking right?

See p. 12 for possible solutions.

Uncommitted

Hook-up as displayed on the PM3000 touchscreen or PMScreen.



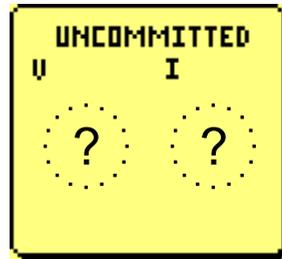
Screenshot from touchscreen or PMScreen

You can use whichever connections are required.



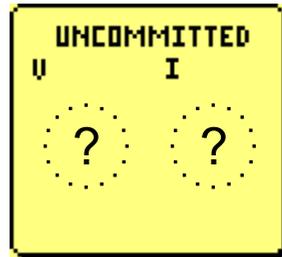
A successful hook-up (based on physical connections and corresponding instrument configuration) is demonstrated via vector outputs as seen on the PM3000 touchscreen or PMScreen.

Unity Power Factor (PF)

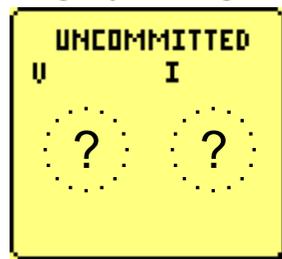


Screenshot from touchscreen or PMScreen

Slightly lagging PF



Slightly leading PF



Phase Angle Summary

Expected phase angles are with respect to the reference vector of ChV1

Hook-Up Description		V1	V2	V3	I1	I2	I3
1	3-Phase 4-Wire Wye	0°	240°	120°	0°	240°	120°
2	3-Phase 4-Wire Delta	0°	-90°	180°	30°	-90°	150°
3	Full 3-Phase 3-Wire 3P-P	0°	240°	120°	-30°	210°	90°
4	3-Phase 3-Wire Delta	0°		60°	-30°		90°
5	3-Phase 3-Wire Wye	0°		60°	-30°		90°
6	3-Phase 2.5-Element Wye	0°	240°		0°	240°	120°
7	3-Phase 1-Element Wye	0°					90°
8	2-Phase 2-Element Wye	0°	180°		0°	180°	
9	Single Phase	0°			0°		
10	Uncommitted	?	?	?	?	?	?

If “Suspect Hook-Up” shows, click on the PMScreen vector diagram where it will show the hook-up that the instrument is anticipating. Click on **Next** for specific information and advice.

Example Errors & Possible Explanations: Vectors

Examples made using a 3-Phase 3-Wire Wye Circuit

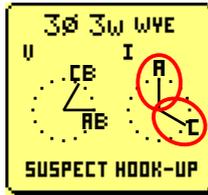
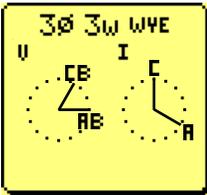
EXPECTED

WHAT YOU SEE

EXPLANATION
& SOLUTION

Unity Power Factor (PF)

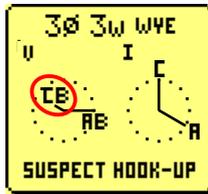
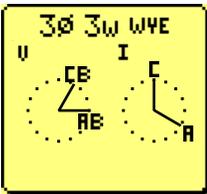
Unity Power Factor (PF)



The CTs are on the wrong phases. Swap the CTs around to align voltage and current Phasing.

Unity Power Factor (PF)

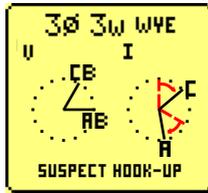
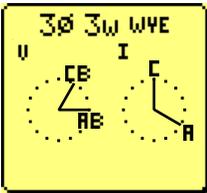
Unity Power Factor (PF)



The CB voltage phase has a bad connection. Try reconnecting.

Unity Power Factor (PF)

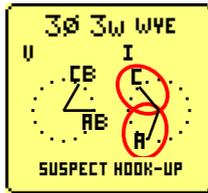
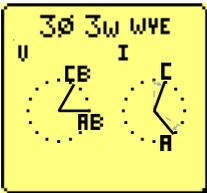
Severely Lagging PF



Power Factor is severely lagging (beyond 45°). "Suspect Hook-Up" message displayed. THIS MAY BE CORRECT so no solution needed.

Slightly lagging PF

Slightly lagging PF



Power Factor is lagging and both CTs are reversed. Turn round the CTs to face them in the correct direction.

For further information and advice in PMScreen click on the vector diagram (which brings up the hook-up the instrument has been set up for) and then on **Next**.