

TSW4048 INVERTER / CHARGERS IN 3 PHASE SYSTEMS

BASIC SYSTEM EXPLANATION:

It is important to understand that the basic 3 phase system using the Apollo Solar TSW4048 Inverter / Chargers uses 3 separate TSWs each as a single phase inverter or charger.

Global Standards:

In most of the world except for North America, the most common voltage for light industrial usage is 230/400VAC “Y or Wye” configuration which provides 3 separate circuits of 230 volts AC measuring from each of the LINE or HOT wire to the NEUTRAL wire. Each leg is 120 degrees of phase difference from the other 2 legs. When the voltage is measured from the HOT or LINE side of each phase leg to either of the other two phase legs, the reading will be 400VAC. A second popular voltage is 240/415VAC. This is also a “Wye” configuration which works the same as the 230/400VAC system described above. The frequency is always 50Hz.

USA / North American Systems:

In the USA, the most common voltage for light industrial usage is 120/208VAC “Wye” configuration which provides 3 separate circuits of 120 volts AC measuring from each of the LINE or HOT wire to the NEUTRAL wire. Each leg is 120 degrees of phase difference from the other 2 legs. When the voltage is measured from the HOT or LINE side of each phase leg to either of the other two phase legs, the reading will be 208VAC. In the USA, the frequency is 60Hz.

If the TSW4048 is being used with AC input from the Mains (Utility Grid) or from a local Generator, the input voltage, frequency and phase must be the same as the AC output in voltage, frequency and phase.

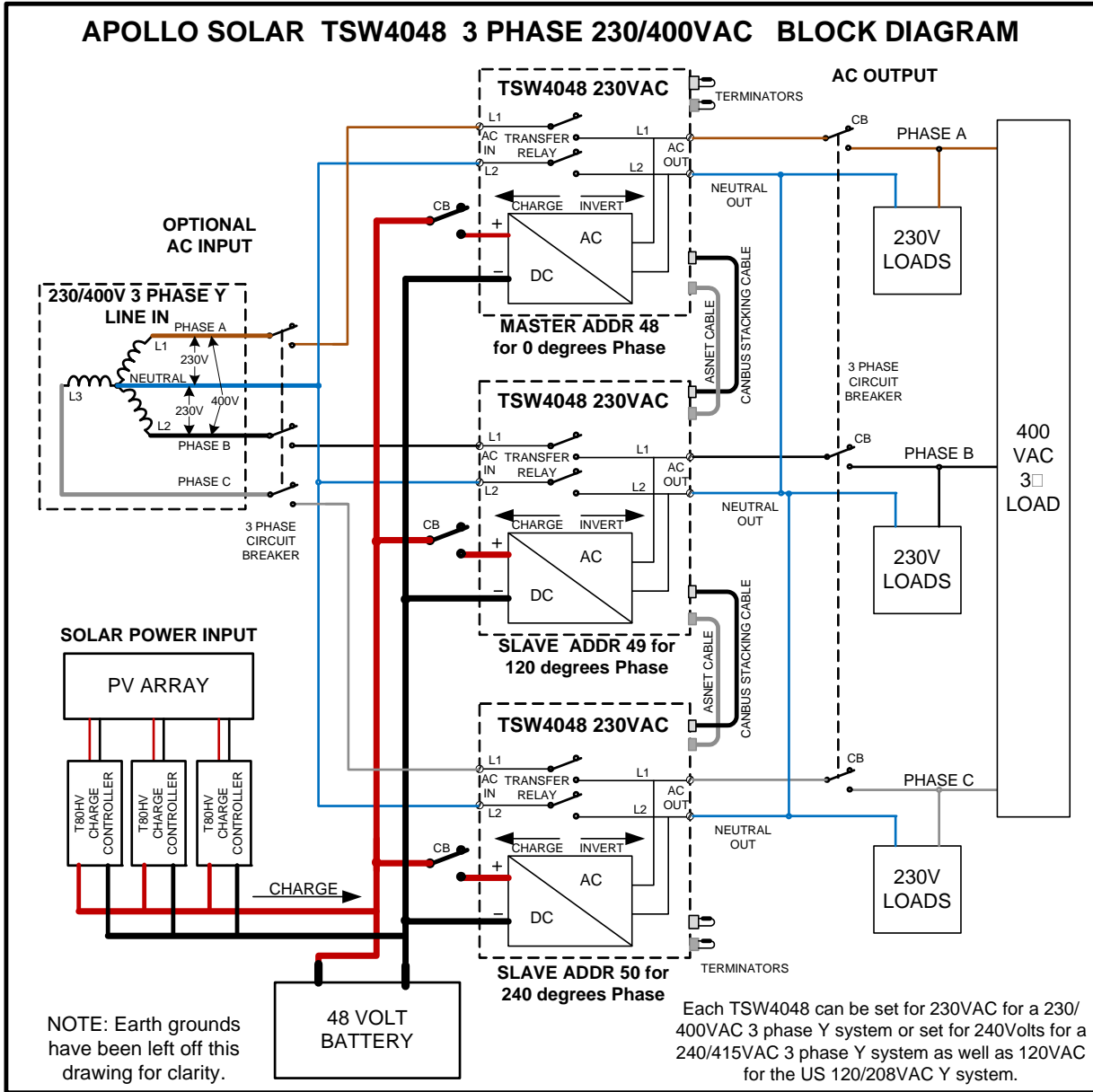
The maximum power available from 3 TSW4048s in a 3 phase configuration is 4kW x 3 or 12kW. When more power is required, the TSW4048s can be wired up to 5 sets of 3 phase clusters. The total number of TSW4048s will be 15 and the total maximum continuous power will be 60kW. Since each TSW4048 can produce up to 200% of the maximum continuous rating for up to 7 seconds, the absolute maximum output of the 15 unit cluster is 120kW. The important for starting large motors for compressors or water pumps.

WIRING DIAGRAM:

The basic block diagram below shows the 3 phase “Wye” AC input with a 3 pole circuit breaker to protect the input wiring. There is also a 3 pole circuit breaker on the AC output. Since the power required changes with each application, these 3 pole circuit breakers must be supplied by the local electrician when the system is installed. They are not included with the Apollo Solar TSW inverter/chargers.

Also shown in the Block Diagram below is the DC connection to the 48 volt battery. The battery may be charged from the TSWs which will use power from the AC when there is extra that the Load does not require.

Alternatively, the Battery can be charged using Solar Power input with Apollo Solar T80HV MPPT Charge Controllers.



Note that the TSW4048 Inverter/Chargers require 2 cables connected between them: Cable 1 is the ASNET for data and Cable 2 is the CANbus Stacking Cable which provides fast control signals from the Master to the Slaves. The Inverters at the end of the stack require Terminators to be inserted into the connectors.

STEP-BY-STEP INSTRUCTIONS:

1. Plan out the location of the TSW4048 Inverter/Chargers such that the high current cables from the batteries is not any longer than 3 meters and all 3 TSWs are about 100mm apart.
2. Mount the TSW4048s securely to the wall. The mounting dimensions are in the TSW Installation manual.
3. Mount the High Current Circuit Breakers for the DC input to the TSWs. Apollo Solar offers the Inverter Switchgear Module (ISM) which provides convenient brackets for the circuit breakers.
4. Run the High Current wire first. It is recommended to use 95mm² or AWG number 4/0 battery cables. Make sure that every connection is tightened to the recommended torque for the size wire and connectors used. If the proper torque is not used, the connection may have some resistance which can cause heat to build up which can melt the insulation on the wire or worse.
5. Add the AC output and optional AC input wires. The gauge of the AC wires must be large enough to carry 40 Amps to EACH Inverter. This is 6mm² or AWG No. 10.
6. The 3 separate AC output and input wires will connect to the 3 pole circuit breakers.
7. Follow the steps in the TSW4048 Installation Manual which describes the setting of the address of each inverter. Note from the block diagram above, that the Master must be set to Address 48, Slave 1 to Address 49 and Slave 2 to Address 50 to provide the proper 3 phase time separation of 120 degrees.
8. The Inverters can be turned on and checked one at a time. Only after each one has been checked should all three DC breakers be turned on.