TDI
Transistor Devices

WC-SYS SYSTEM

OPERATOR'S MANUAL

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INTRODUCTION

This manual is intended to serve as an extension to the **WCL488** operation/programming manual. The system is dependent on the operation of the master unit. Please review the manual provided for the **WCL488** for operating instructions.

The WCS488 electronic load system consists of a master control unit in conjunction with up to nine (9) slave modules. The slave modules are dependent on the master to operate. Therefore, do not attempt to operate the slave units without a master control unit.

The WCS488 System is designed to automatically detect the presence of the slave units. In operation, the control display on the master will indicate the total system rating based on number of slave units detected. The voltage and current ranges selected will also be taken into account and reflected in the system rating. The user may choose to operate the system with any number of slaves. When the AC power is applied to the slave, it becomes active in the system. If the slave is not turned on the master will not detect it and will configure the system accordingly. There is no requirement to sequence the use of slaves. A system will operate normally regardless of which slave unit or units are selected.

FULL SCALE RANGE SWITCHING

The WCL488 series provides selection of one of three full scale input voltage ranges and one of three full scale input current ranges. The full scale voltage and current ranges may be selected in any combination resulting in nine (9) operational ranges per unit. These are selectable over the bus as ranges (1 thru 9 refer to IEEE-488 syntax section). All active slave units will automatically change current range as selected by the master unit.

The selectable ranges provide increased resolution. For example: Setting 10 amps may be difficult using the 1000 amp full scale. By selecting a lower full scale, 100 amps, the resolution of the meters, IEEE-488 control, programming input and the current sample output are greatly increased.

SYNCHRONIZED PARALLELING

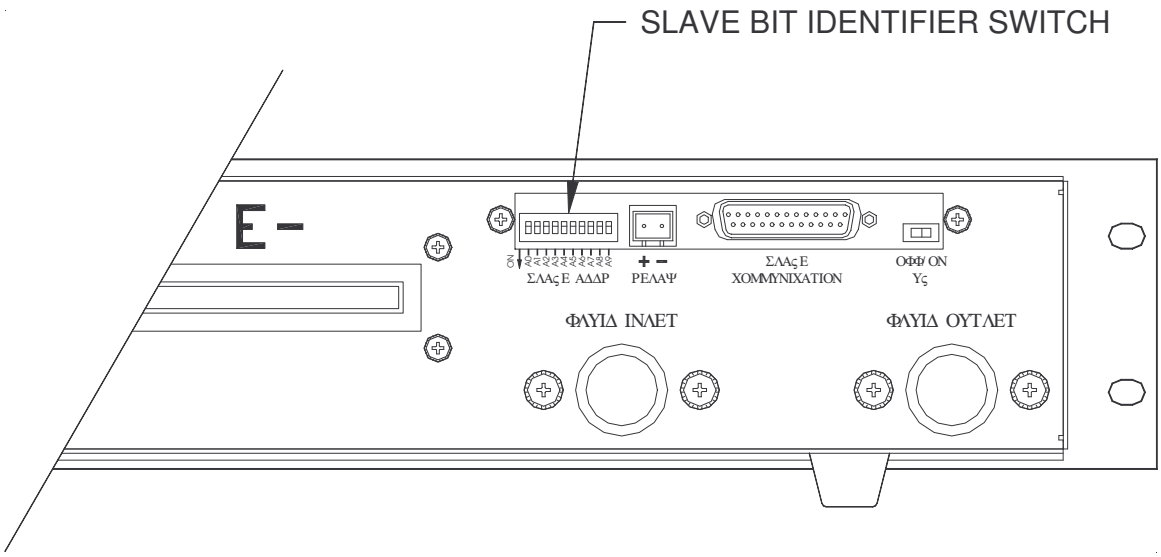
The synchronized paralleling function allows the user to connect one (1) or more slave units in parallel. The master is controlled through normal operation; the slaves are connected via a twenty five (25) pin ribbon cable. For systems assembled at the factory, this cable is provided. This cable contains all the necessary signals for the slave to respond to the master unit. In all operating modes, the master and all slaves will share the current in proportion to the selected current range.

SLAVE CONFIGURATION

When configuring a master/slave system, each slave unit must have it's bit identifier set in order to communicate correctly with the master. On the rear panel of each slave unit there is a dipswitch which must be set to a proper number. Please refer to figure 1 for clarity. The switch must be set to a slave ID number. Starting at 1 set each sequential slave to the next number. **You must be sure that no two slaves are set to the same number**. This will confuse the master and it will not identify the second slave unit.

The master unit will detect all slaves present and self configure to reflect the full system rating. The master will report all system conditions i.e.: current and power levels and all alarms including slave alarm status.

Not all slaves need to be used in order to operate. If a slave is turned off, the master detects this and configures based on the number of slaves. Pressing the "slave" button on the master will display the number of slave units present.



COOLING CONNECTIONS AND REQUIREMENTS
IMPORTANT

Before using this product, you must fully understand the relationship between the water temperature, flow rate, and power dissipation. Failure to meet the cooling requirements could result in an unexpected system shutdown or a catastrophic failure.

The WCS488 Electronic Load System requires a sustained flow of coolant in order to operate. Each unit is designed to operate to its full power rating, of 12,000 watts, with a minimum flow rate of 3 gallons per minute (GPM) per unit. Be sure that you properly size your piping in order to meet this requirement. A system with one (1) Master unit and nine (9) Slave units will require a total flow rate of 30 gallons per minute.

Never attempt to “daisy chain” the water lines. The exhaust water will be too warm to sustain a second unit in series. The water lines must always be connected in parallel with the main water feed. If you are constructing your own water scheme, be sure to size your water manifolds to allow for proper flow and pressure at each load. An imbalance in the flow to each unit could cause an overtemperature shutdown to occur.

If you are unsure about your requirements please consult the factory.

Each load assembly has one inlet and one outlet water connection. Quick disconnect water lines are provided in factory built systems. These allow for easy connection to the main water manifolds. If a water line needs to be disconnected, always disconnect the manifold end and not the unit end. The water connectors are self sealing at one end only.

If you are using a “chiller” to regulate the water temperature, be sure to properly size the device to match or exceed your cooling requirements. The specifications for the wattage capacity and flow rates are provided from all chiller manufacturers. If your location can provide “processed water” be sure the maximum pressure does not exceed 60 PSI.

REAR PANEL CONNECTIONS

POWER INPUTS

The main DC power inputs are labeled E- and E+. These are recessed for safety and require lugs with a ½" diameter hole. Two connection points are provided for each input.

CAUTION - **Only the power source-to-load connections are to be made to these studs. Always be sure these connections are securely tightened. A loose connection will result in a high temperature at the connection.**

THE TERMINAL STRIP

For easy access, a terminal block is provided on the rear panel of the system. This is internally wired to the master unit and will allow the user to connect to the master without having to route cables from inside the cabinet.

SENSE- (S-) AND SENSE+ (S+) - are the voltage sense terminals. Do not attempt to connect these inputs as the load inputs, internal damage to the load may occur.

E- AND E + - are connected internally to the power input studs. They are to be used only as a convenient connection point for the sense terminals when sensing the voltage locally.

EN – This terminal is the remote enable. It must be connected to S- in order for the load to operate. It will also serve as an emergency power off (EPO).

SYN - this terminal supplies a 15V sync signal for triggering external instrumentation.

REM - this terminal is the connecting point for remote programming from an external programming source.

CS - this terminal is provided for the current sample output signal. The current sample output should be referenced to the S-terminal.

THE "IEEE-488" CONNECTOR (RS232 OPTIONAL)

This is utilized for computer control and utilizes a standard IEEE-488 cable or an RS232 cable if specified.

AC INPUT

This connection provides the Dynaload system with its operating power and its safety ground. Power requirements are 1 amp @ 115vac per unit, maximum 10 amps.

E+ AND E- WIRING TIPS

- Use short cables that are large enough in cross-section to handle the power source's current output.
- Twist and/or bundle the E+, E- cable(s). This will reduce self-inductance
- Use lugs to secure the E+, E- cables to the studs.
- Connect only the power source to load cables to these studs; all other connections must be made via the terminal strip located below the studs.

S- AND S+ WIRING TIPS

S- and S+ (Sense- and Sense+) are used to sense the load voltage. They may be connected at the back of the Dynaload, or remotely at the source. In addition, all input and output signals are referenced to S-. In any single or multiple load system, S- should be connected to E- (or the negative of the source) at **one and only one point**.

CAUTION **- Damaging current loops could result from multiple connections to E-**

The Dynaload is supplied with two (2) metal straps between the S-, E- terminals and between the S+, E+ terminals on the terminal strip. These are to facilitate voltage sense wiring when sensing locally.

The S-, S+ external sense leads can be connected any where between the power source and the Dynaload. However, it is recommended that the voltage sense wires are connected to the power source terminals. This will eliminate potential errors due to voltage drop in the cable. It is also recommended to use shielded wire for the remote voltage sense leads to prevent external noise from being introduced into the system.

S- must only be connected to the E- source at the master Dynaload in a master/slave (parallel) configuration. The D connector cable(s) between master and slave(s) provide the S- loop to the slave(s).

EN

This input is used for remote operation of the DC on/off function. It can also serve as a remote emergency power off function. This input is TTL negative true in order for the load to operate. It is normally tied to (S-) for local or IEEE control. For EPO operation, a remote switch can be connected between (EN) and (S-). This switch must be normally closed. By opening the switch, the load will move to a DC off condition.

SYN

For instrumentation triggering purposes, a 15V square wave, synchronous to the internal pulse generator, is supplied. As with all signals in or out, it is referenced to S (-). The signal is generated with a 10Kohm pull-up resistor to 15V, and an open collector pull-down to S-. The amplitude of the square wave may be externally limited without damage to the load. When not in pulse mode, this output remains high until a current change is executed. At this time, the output is pulsed low for scope triggering.

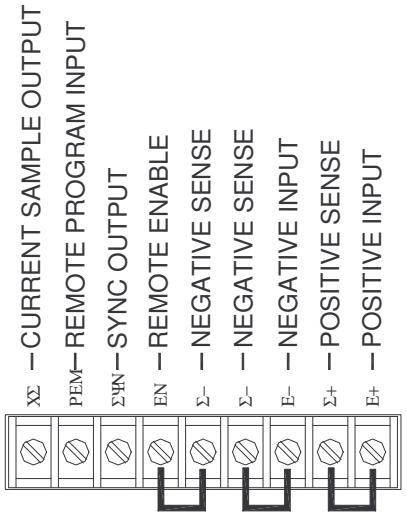
CS

0-10V signal representing 0-full scale current in each of the current ranges. This signal is a true representation of the current level and waveform being generated by the load. Connect an oscilloscope or other external instruments to this terminal as an external monitoring device. The instruments should be referenced to terminal S-. Shielded wire is recommended.

REM (EXTERNAL MODULATION)

This is the remote control input signal. 0 to 10 volts in yields 0 to full scale loading in whatever mode and range is selected. When a signal or waveform is presented at this input it will be translated directly into your current level and waveform. The signal source should be referenced to S-. Shielded wire is recommended.

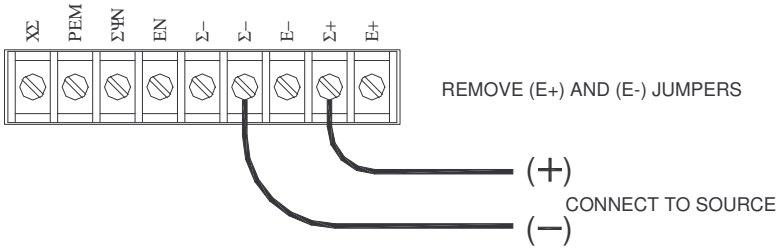
TERMINAL BLOCK CONNECTIONS



FOR LOCAL VOLTAGE SENSING, CONNECT (S+) TO (E+) AND CONNECT (S-) TO (E-) FACTORY INSTALLED JUMPERS ARE PROVIDED.

NOTE:
THE POSITIVE AND NEGATIVE INPUTS ARE PROVIDED ON THE TERMINAL BLOCK FOR EASE OF CONNECTION. DO NOT CONNECT THESE INPUTS TO YOUR TEST SOURCE AT ANY TIME. DAMAGE TO THE UNIT MAY RESULT.

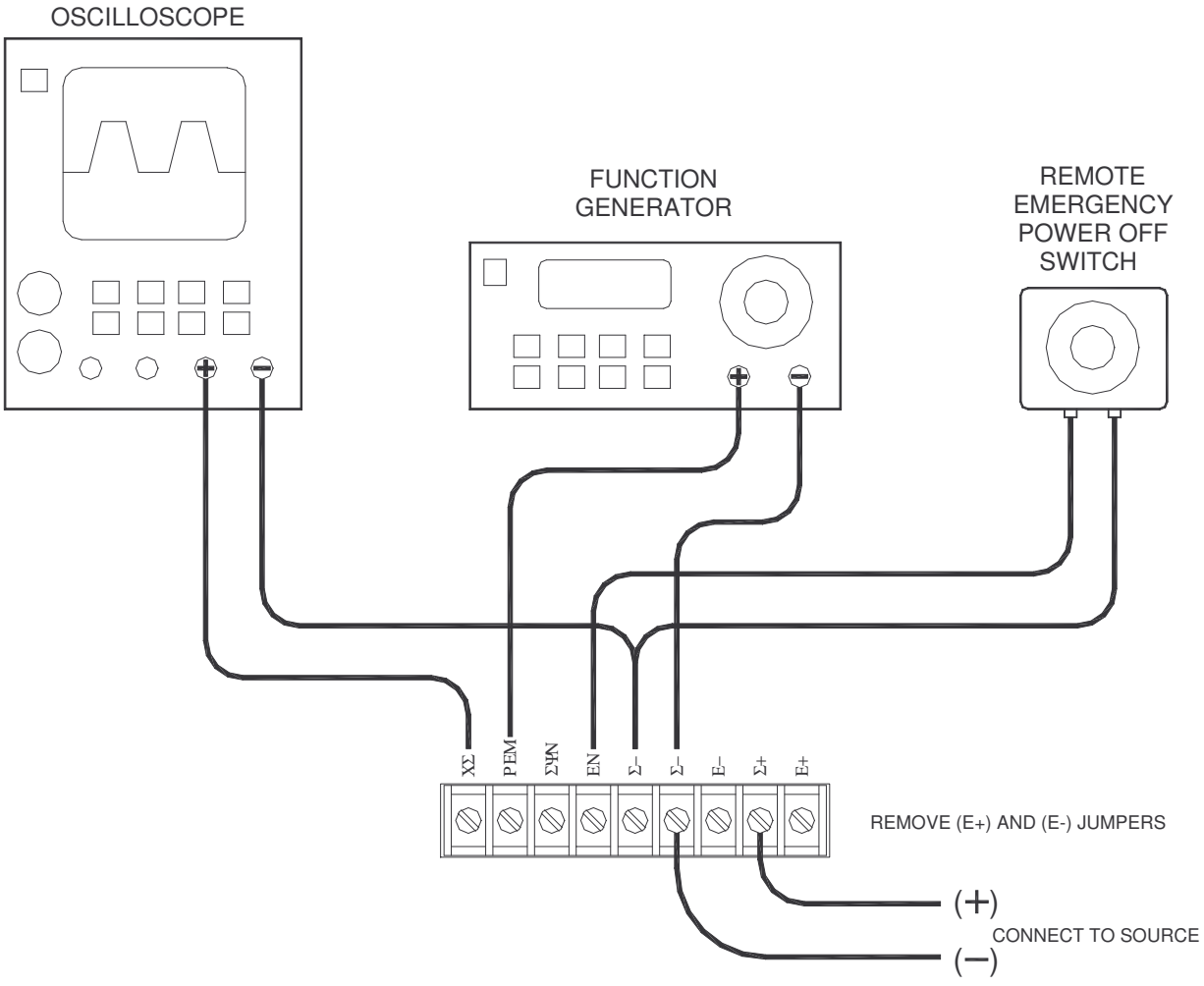
REMOTE VOLTAGE SENSE



FOR IMPROVED VOLTAGE READBACK, USE THE REMOTE VOLTAGE SENSING CAPABILITIES.

1. REMOVE THE JUMPERS FROM (E+) TO (S+) AND (E-) TO (S-).
2. CONNECT THE (S+) TERMINAL TO THE POSITIVE OUTPUT ON THE TEST SOURCE.
3. CONNECT THE (S-) TERMINAL TO THE NEGATIVE OUTPUT ON THE TEST SOURCE.

TERMINAL BLOCK CONNECTIONS
OPTIONAL EQUIPMENT WIRING



OPERATING INSTRUCTIONS

The following procedure is recommended for connecting the Dynaload:

1. AC switch should be turned off.

2. Connect DC source to E+ and E-. Always check for correct polarity.

3. If external analog programming is to be used, connect signal source. If IEEE-488 or RS232 (optional) is to be used, connect the cable.

4. Connect AC power. The system is configured at the factory for 115VAC input. If you are connecting to 220VAC, the AC voltage input selector on each unit must be reset.

5. Turn on the AC power; the meters should come on and the fan will run.

6. Step through the menu settings to be sure the setpoints are appropriate to the application. Check to see that the voltage and current ranges selected are correct.

7. Press the DC-ON button, or send the LOAD ON command via the IEEE controller. This will close the relays and connect the source to the power dissipating circuitry. The DC-ON LED will illuminate.

8. Turn on the source to be tested.

9. Press the mode select button for the mode you wish to operate in. The LCD display will prompt you for a numeric value. Enter an appropriate number for the level desired. Press ENTER
   For computer controlled operation, begin sending the appropriate commands. (See IEEE-488 syntax for command listing)

10. The load will now be operating to the prescribed level.

FAULT INDICATORS

The WC-SYS system is designed to provide protection circuits with alarm outputs. These alarm conditions are indicated on the front panel of the individual slave units and is also reported to the master controller. An alarm condition will be reported by the master if any slave unit is in need of service.

Red is alarm or serious problem. (Unit will shut down, but the fan will continue to run.)

UV - Undervoltage - DC ON will not function until voltage is present. (Over ride switch provided on rear panel)

OV - Overvoltage - Unit will disconnect from source

OT - Overtemperature- Unit will shut down

Yellow is a warning. (Unit may continue to operate, but may be out of regulation.)

OC - Overcurrent - Unit has reached the set current limit or the current limit of the selected range.

OP - Overpower- Unit has reached the set power limit.

SAT - Saturation - Saturation condition whereby one or more of the electronic power components are completely turned-on. This may be due to insufficient source voltage or inadequate wiring. This may also indicate electronic component failure.