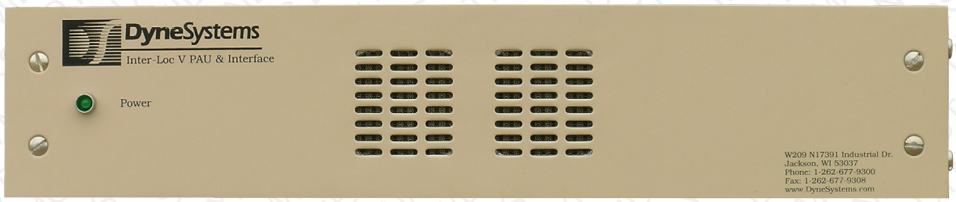
DyneSystems, Inc.

Midwest & Dynamatic Dynamometers



DS630
Throttle Controller

USER MANUAL

Job # _____

Model # _____

Serial # _____

FROM DYNE SYSTEMS, INC.

The DS630 Throttle Controller is an actuator/throttle position controller designed to control the position of Dyne Systems, Inc. (DS) actuators as well as the older high-speed and high-torque actuators. No other actuators are officially supported although some may work. This Throttle Controller is designed to operate with the Inter-Loc V Controller, allowing for a user-friendly interface via the DS Operator Control Station (OCS). The DS630 Throttle Controller is designed to operate only with an Inter-Loc V Controller containing an optional throttle card.

Features Summary:

- Sub-D connections are used to interface with the Inter-Loc V Controller.
- Fault detection (e.g. actuator stall, power fail, etc.).
- Three Calibration Options (Local, Remote, and Manual).
- User-Friendly Interface with touch screen control, position feedback, and fault indications, via the DS Operator Control Station (OCS).

NOTE: *This manual is intended for use by qualified personnel only. All Dyne Systems' approved drawings (if included) and specific instructions for this equipment must take precedence over general information contained in this manual.*

Thank you for purchasing this product from Dyne Systems. Our staff is at your disposal, should you need information or support that is not found in this manual.

DyneSystems, Inc.
Midwest & Dynamatic Dynamometers

CONTROLS, DYNAMOMETERS, SYSTEM INTEGRATION AND TEST CELL AUTOMATION

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SECTION 1: GENERAL INFORMATION

Dyne Systems, Inc. (hereafter referred to as DS) is the sole Original Equipment Manufacturer (OEM) of the DS630 Throttle Controller. This manual, intended for qualified personnel only, contains instructions for proper handling, installation, and operation of the DS630 Throttle Controller. All DS approved drawings (if included) and specific information for this equipment must take precedence over general information contained in this manual.

SAFETY

Read your instruction manual! Electrical rotating equipment can be dangerous. Prior to operation, become familiar with all safety instructions and procedures. WARNING, CAUTION and NOTE labels are used throughout the manual to remind you of the hazards that exist. Know your equipment before handling or working on it.

Used to warn of the possibility of injury to personnel and damage to equipment

Used to caution of the potential hazards and unsafe practices

NOTE: *Used for special instructions related to safety, proper operation or maintenance*

RECEIVING INSPECTION

Upon the arrival of your equipment, check all items received against the packing slip to ensure the shipment is complete. Then inspect for damage. Any evidence of rough handling may be an indication of hidden damage.

Be sure to perform the following inspections:

1. Inspect packaging and skid(s) for any mistreatment. Document and photograph any signs of damage.

2. Inspect housing to ensure there is no damage and that unit is intact.

DAMAGE CLAIMS

In the event of damage, report it without delay to the carrier and Dyne Systems. Dyne Systems' warranty policy does not cover shipping damage or lost material. It is important to file a damage claim with the carrier promptly. If you require assistance in settling the claim, contact Dyne Systems. Refer to equipment by purchase order, model, serial and job numbers, as shown on the nameplate of the unit involved.

TRAINING

Training programs are an essential part of safe and correct operation. Training provides the know-how necessary to obtain top performance from your equipment. Dyne Systems recognizes this fact and offers training classes on-site or at the factory to educate personnel in safe operating and maintenance procedures.

IDENTIFY YOUR PAU

The DS630 Throttle Controller was configured at DS to interface with your Inter-Loc V Controller (Throttle Card installed). Review the diagrams and verify you have the correct configuration:

Note: *Your Inter-Loc V should have a Throttle Card installed.*

Locate the model and serial numbers on the DS630 Throttle Controller, and verify that they are the same as that shown on the cover of this manual. This information should be used when contacting DS customer support.

SECTION 2: INSTALLATION ENVIRONMENT

The DS630 Throttle Controller should be mounted so it is not exposed to sever shock and/or vibrations. If adverse conditions are anticipated, the DS630 Throttle Controller can be mounted using vibration-damping materials.

1. The atmosphere should be free of corrosive gases.

2. The atmosphere should be free of vapors or powders that could cause fire or explosion.

3. Relative humidity should be 0 to 95%, non-condensing.

4. Temperature range should be 32 °F – 90 °F (0 °C – 32.2 °C).

SECTION 3: INSTALLATION

Mounting

The DS630 Throttle Controller comes in a 3.5”h x 17”w x 15”d enclosure designed to fit into a standard 19” rack mount enclosure. DS also provides rack mount brackets for ease of installation. Unless previously specified, the end user is responsible for providing the mounting system.

NOTE: *The DS630 Throttle Controller requires air to circulate through its enclosure for proper cooling. Be sure to provide 2-3”of space at the front and rear of the enclosure to allow air flow.*

Electrical Connections

All electrical connections should correspond with the schematic provided by DS at the time of delivery. General connection information is provided to show the location of all possible connections to the DS630 Throttle Controller, for pin-outs of all connections reference the “CONNECTIONS” section (SECTION 4).

NOTE: *Only a qualified electrician should install the DS630 Throttle Controller. All installations should comply with the most current version of the National Electrical Code (NEC) as well as all local codes and regulations.*

NOTE: *Refer to Figure 3.1 for the DS630 Throttle Controller rear panel connector locations.*

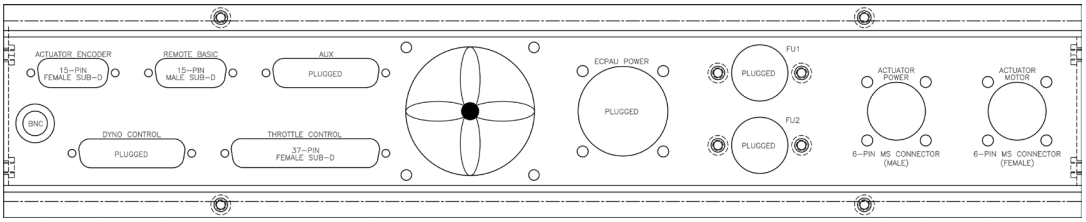

Figure 3.1 - DS630 Throttle Controller Rear Panel Connector Locations

SECTION 4: CONNECTIONS

The DS630 Throttle Controller has three Sub-D Connectors and two 6-Pin MS Connectors that interface with external devices.

All of the digital Inputs and Outputs (I/O) use PLC-level (i.e. Positive 24VDC) logic.

SUB-D CONNECTORS

ACTUATOR ENCODER (15-Pin Female Sub-D): Actuator Position Feedback

PIN #	FUNCTION	COMMENTS
1	Common	Encoder Common
2	5VDC (o)	Encoder Power
3	A (i)	Encoder Signal A
4	A' (i)	Encoder Signal A Not
5	B (i)	Encoder Signal B
6	B' (i)	Encoder B Not
7	ILK (i)	Encoder Operation Feedback
8	Shield	Shield
9	Common	Encoder Common
10	5VDC (o)	Encoder Power
11	A (i)	Encoder Signal A
12	A' (i)	Encoder Signal A Not
13	B (i)	Encoder Signal B
14	B' (i)	Encoder Signal B Not
15	ILK (i)	Encoder Operation Feedback

Table 4.1

REMOTE BASIC (15-Pin Male Sub-D): Remote Station Control

PIN #	FUNCTION	COMMENTS
1	24VDC (o)	Remote Station Power
2	Common	Remote Station Common
3	Button_Up (i)	Remote Station Up Button
4	LED_Lower (o)	Remote Station Lower Limit LED Indicator
5	LED_Upper (o)	Remote Station Upper Limit LED Indicator
6	Button_Down (i)	Remote Station Down Button
7	LED_Accept (o)	Remote Station Accept Limit LED Indicator
8	Button_Soft_Shutdown (i)	Remote Station Soft Shutdown Button
9	24VDC (o)	Remote Station Power
10	Common	Remote Station Common
11	NC	Not Connected
12	NC	Not Connected
13	NC	Not Connected
14	Button_Enter (i)	Remote Station Enter Button
15	LED_Fault (o)	Remote Station Fault LED Indicator

Table 4.2

THROTTLE CONTROL (37-Pin Female Sub-D): Inter-Loc V Interface

PIN #	FUNCTION	COMMENTS
1	Position Command (i)	Position Command Input from Inter-Loc V.
2	Shield	Position Signal Shield
3	Actuator On (i)	Actuator On/Off Control Input from Inter-Loc V
4	(Pi) Power Common	Power Common (+24VDC)
5	(Pi) Power Common	Power Common (+24VDC)
6	Power (+24VDC) (o)	Output Power (+24VDC) to Inter-Loc V.
7	NC	Not Connected
8	Actuator Position Feedback (o)	Actuator Position Feedback Signal to Inter-loc V
9	Shield	Actuator Position Feedback Shield
10	NC	Not Connected
11	(Pi) Power Common	Power Common (+24VDC)
12	Lamp – Lower Limit (i)	Remote Station, Lower Limit Lamp Input Power from Inter-Loc V
13	Lamp – Upper Limit (i)	Remote Station, Upper Limit Lamp Input Power from Inter-Loc V
14	Lamp – Accept (i)	Remote Station, Accept Lamp Input Power from Inter-Loc V
15	Lamp – Fault (i)	Remote Station, Fault Lamp Input Power from Inter-Loc V
16	Shield	Shield
17	ILK (o)	Actuator Encoder Interlock Output to Inter-Loc V
18	A (o)	Actuator Encoder Clock A (+) to Inter-Loc V
19	B (o)	Actuator Encoder Clock B(+) to Inter-Loc V
20	Position Command Common (i)	
21	Reset Command (i)	Reset Command from Inter-Loc V
22	ESTOP (i)	ESTOP Signal From Inter-Loc V
23	Power Fail (o)	Power Fail State to Inter-Loc V
24	PAU Ok Feedback (o)	PAU Ok Feedback to Inter-Loc V
25	Power (+24VDC) (o)	Output Power (+24VDC) to Inter-Loc V
26	NC	Not Connected
27	Actuator Position Feedback Common (o)	Actuator Position Feedback Common to Inter-loc V
28	Actuator Position Excitation (o)	Actuator Position Excitation (+10 VDC)
29	(Pi) Power Common	Power Common (+24VDC)
30	Button – Up (o)	Remote Station, Button Up to Inter-Loc V
31	Button – Down (o)	Remote Station, Button Down to Inter-Loc V
32	Button – Enter (o)	Remote Station, Button Enter to Inter-Loc V
33	Button – Soft Shutdown (o)	Remote Station, Button Soft Shutdown to Inter-Loc V
34	+5 Volts (i)	Actuator Encoder Excitation from Inter-Loc V
35	Common	Common
36	A* (o)	Actuator Encoder Clock A (-) to Inter-Loc V
37	B* (o)	Actuator Encoder Clock B(-) to Inter-Loc V

Table 4.3

MS CONNECTORS

ACTUATOR POWER (6-Pin Male MS Connector): Input Power from Inter-Loc V Power Transformer

PIN #	FUNCTION	COMMENTS
A	Hot 120VAC Input (i)	120VAC (Hot) Input Power
B	Neutral 120VAC (i)	120VAC (Neu) Input Power
C	GND	Ground
D	40VAC Input (i)	40 VAC Input Power
E	Center Tap	40 VAC Transformer Center Tap
F	40VAC Input (i)	40 VAC Input Power

Table 4.4

ACTUATOR MOTOR (6-Pin Female MS Connector): Output Actuator Power

PIN #	FUNCTION	COMMENTS
A	(+) Actuator Armature (o)	Positive Actuator Output Power
B	NC	Not Connected
C	NC	Not Connected
D	(-) Actuator Armature (o)	Negative Actuator Output Power
E	(-) Actuator Armature (o)	Negative Actuator Output Power
F	(+) Actuator Armature (o)	Positive Actuator Output Power

Table 4.5

SECTION 5: OPERATION

NOTE: *All control of the DS630 Throttle Controller is done via the Inter-Loc V Operator Control Station (OCS).*

DIGITAL AND ANALOG I/O

NOTE: *As stated in a Section 4, all digital I/O is +24VDC (Positive) logic.*

Inputs

The DS630 Throttle Controller is entirely controlled via digital and analog inputs. These inputs are directly interfaced with, and processed by, the Inter-Loc V Controller.

NOTE: *The "SOFT SHUTDOWN" button on the Remote Station is a valid active input. When pressed, the DS630 Throttle Controller will enable itself (if not already enabled), will return the actuator to the zero position, and finally will disable itself. The resulting SSD condition is NOT a fault; however, it does prevent the DS630 Throttle Control from being re-enabled and must be cleared via a "Reset" command.*

NOTE: *To minimize/eliminate the effects of offset voltages at the analog position command input, the DS630 Throttle Controller ignores all command voltages less than 20 mV (i.e. 0.2% position).*

Outputs

All digital outputs are available through the "Throttle Control" connector; these outputs annunciate the state of the DS630 Throttle Controller to the Inter-Loc V Controller.

FAULTS

When a fault occurs, the DS630 Throttle Controller performs one of two actions (depending on the type of fault). Some faults cause the actuator to return to the zero position and then disable. Other faults simply disable the DS630 Throttle Controller and leave the actuator position as is (usually to prevent damage to the DS630 Throttle Controller). After resolving the fault condition, the DS630 Throttle Controller can be cleared by issuing a "Reset" command.

NOTE: *Detailed fault descriptions are available via the OCS display only.*

The Actuator may remain at its previous position even after clearing and resetting some faults. Use caution when restarting the system as the throttle may still be set at the previous position.

FAULT	ACTION	CAUSE
Loss of Actuator Encoder ILK	Disable	The actuator cable may be disconnected or damaged. The actuator's encoder could also be faulty.
Invalid Span	Disable	The actuator is improperly calibrated (i.e. insufficient span). A sufficient span must be between 27,000 and 42,000 counts. This fault occurs only when the operator attempts to enable the DS630 Throttle Controller. Successfully re-calibrate the upper and lower limits to eliminate this fault.
Loss of PAU OK	Disable	Most likely, a hardware fault internal to the DS630 Throttle Controller (Over-Temperature, Over-Current, etc.)
Throttle PAU Power Fail	RTZ	The head supply voltage has fallen below +20 VDC. Verify the line voltage is at or near 120VAC. **NOTE:** *This fault always occurs when the DS630 Throttle controller is powered down.*
Stalled	Disable	Actuator movement is blocked. Could also occur due to improper calibration of upper and lower limits.

Table 5.1

NOTE: *For further information regarding Faults and Fault Actions, please reference the Inter-Loc V User's Manual, Chapter 4,"Controllers", Section 3.3.2, page 4.40.*

CALIBRATION

Actuator calibration is a critical part of the overall operation of the DS630 Throttle Controller. It is vital that the Upper and Lower limits of the actuator movement be correctly set and periodically adjusted to compensate for drift. Calibration is initiated, performed, and saved in one of three methods, via the OCS touch screen display (Local Mode Calibration), via the pushbuttons on the Remote Station (Remote Station Calibration), or manually (Manual Calibration). To access the calibration page:

1. Press the "Calibrate" button on the OCS front panel.

2. Touch "Position" on the "Calibration Selection" popup.
a. The following calibration page will then appear:

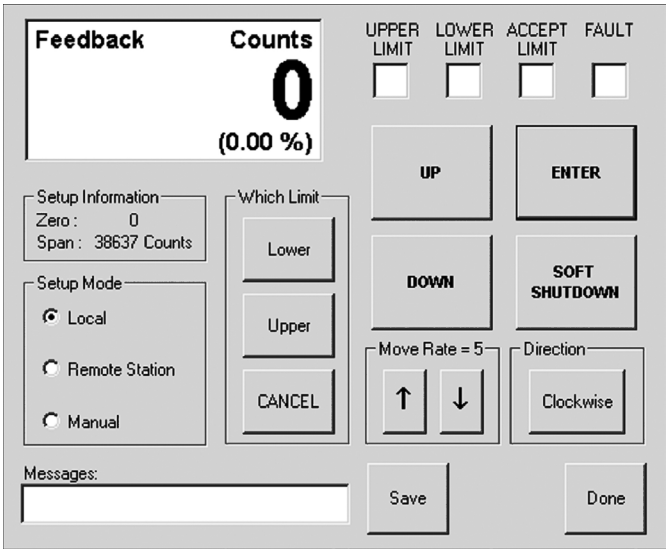

Figure 5.1

3. Select the type of calibration from the "Setup Mode" area on the bottom left of the calibration screen.

NOTE: *It is assumed that the OCS display is visible during the calibration process; however, this is not a requirement. Familiarity with the calibration procedure, combined with feedback to the operator (via the LED's on the Remote Station box) ultimately allows calibration to be performed with only the Remote Station box in hand (and the OCS display not visible).*

Local Mode Calibration

1. Touch “Local” in the Setup Mode group. This activates all on-screen setup buttons.

2. Touch the “Lower” button to begin calibration of the 0 percent throttle position. The “LOWER LIMIT” annunciator will turn bright red to remind the operator that the 0 percent position is being established.

3. Touch and hold the “UP” and “DOWN” buttons to move the throttle to the desired 0 percent position.

NOTE: *Once past the previously set limits, the “UP” and “Down” buttons cannot be held to move the actuator arm, they must be repeatedly touched.*

4. When the throttle is at the desired 0 percent position, touch the “ENTER” button. The position reading is reset to 0 percent, the “LOWER LIMIT” annunciator turns off, and the “ACCEPT LIMIT” annunciator will turn bright red.

5. Touch the “ENTER” button again to accept the new lower limit setting. The “ACCEPT LIMIT” annunciator turns off and the calibration procedure automatically proceeds to set the 100 percent position. The “UPPER LIMIT” annunciator turns bright red.

6. Touch and hold the “UP” and “DOWN” buttons to move the throttle to the desired 100 percent position (Must be between 10,000 and 42,000 counts).

7. When the throttle is at the desired 100 percent position, touch the “ENTER” button. The position reading is set to 100 percent, the “UPPER LIMIT” annunciator turns off and the “ACCEPT LIMIT” annunciator turns bright red.

8. Touch the “ENTER” button again to accept the new upper limit setting. All annunciators turn off and the actuator returns to the 0 percent position.

9. Touch the “Save” button to save the calibration, touch the “Done” button to exit without saving.

Remote Station Calibration

Remote Station calibration is identical to Local Mode calibration except the OCS setup buttons are disabled forcing similar buttons on the Remote Station box to be used. The layout of the buttons and LED’s on the Remote Station box is identical to the layout on the OCS. This method should always be used (if available) since the Remote Station box is typically located near the actuator and/or throttle mechanism allowing the operator to move the actuator while simultaneously viewing the position of the throttle.

Remote Station calibration is selected by touching the “Remote Station” button in the “Setup Mode” group. This de-activates all on screen buttons, forcing the use of the Remote Station box. Next, follow the “Local Mode Calibration” procedure, substituting the Remote Station buttons and LED’s where applicable.

Manual Calibration

Manual calibration is the easiest and quickest calibration method available. It can be used with or without the existence of a Remote Station box; however, this method is fastest if a Remote Station box is available. Manual calibration is the same as the previously described position calibration methods except the DS630 Throttle Controller is disabled. This allows the actuator arm to be moved manually (by hand) instead of using the “UP” and “DOWN” buttons. The “ENTER” button is still active (both on the OCS and the Remote Station box), so when the 0 percent and 100 percent positions are set, either of these “ENTER” buttons can be pressed to accept the respective limit.

Manual calibration is selected by touching the “Manual” button in the “Setup Mode” group. Then follow the “Local Mode Calibration” procedure, but move the actuator arm manually as needed.

NOTE: *For more information on all three of these calibration procedures, please reference the Inter-Loc V User’s Manual, Chapter 7 “Transducers,” Section 5.2.*

SECTION 6: ACTUATOR SUMMARY

Over the years, DS has used three different actuators. The latest actuator is the “Standard” actuator. The DS630 Throttle Controller can be used with all three actuators. Be sure that the actuator in use is listed below, otherwise calibration faults and other issues may occur.

Table 6.1 shows all three DS actuators and some of their specifications.

Actuator	Voltage (Volts)	Encoder (PPR)	Max Move Rate %/sec	Gear Ratio	Nominal Counts	Minimum Counts	Maximum Counts
Standard	24	200	200	246:1	38,000	10,000	42,000
Old High-Torque	12	200	400	246:1	38,000	10,000	42,000
Old High-Speed	12	500	700	134:1	52,000	10,000	57,000

Figure 6.1 - Dyne Systems Actuators

NOTE: *The DS630 Throttle Controller will never command movement rates beyond 500%/sec even though the older high-speed actuators are capable of higher rates.*

NOTE: *If the actuator in use is not listed above please contact DS.*

SECTION 7: CUSTOMER SUPPORT

Dyne Systems Customer Support can be reached at 1-800-657-0726 or by Email at sales@dynesystems.com. Please have the serial and model numbers available for all products.

SECTION 8: PRODUCT WARRANTY

WARRANTY, REMEDIES AND LIMITATIONS: Dyne Systems, Inc. warrants the following equipment will conform to published specifications and be free from faulty material or workmanship for the listed time period from date of shipment or onsite repair:

New Controls	12 Months
Service Calls	3 Months
Repaired Controls	3 Months

This warranty covers properly installed equipment used within specified limits and ambient conditions and is limited to repair or replacement of equipment proving defective at Dyne Systems. For warranty to be valid, Buyer must conform to Dyne Systems' factory specifications. If applicable, terms of Warranty Validation and Delivery Certification must be met for warranty to be valid. This warranty does not apply to experimental, developmental or non-standard Goods and Products which are sold "as is", "where is". Dyne Systems shall not be liable for labor costs associated with removing, reinstalling or delivering any equipment. Transportation costs associated with delivering products to Dyne Systems under the warranty are the responsibility of the Buyer. Transportation costs associated with returning products to the Buyer under the warranty are the responsibility of Dyne Systems. If warranty service is deemed necessary and product (i.e. controls, small dynamometer, etc) can be shipped to Dyne Systems then it is expected that product be sent to Dyne Systems; however, if Buyer wants warranty work to be performed onsite and Dyne Systems deems it feasible then Buyer will be responsible for travel hours and travel / transportation costs. Dyne Systems is not liable for costs incurred such as loss of work time or production time or for loss of profits or other damages, including, but not limited to consequential damage.

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LIMITATION OF LIABILITY: Dyne Systems' liability for defective or nonconforming products, whether based on breach of warranty negligent manufacture or product liability, is exclusively limited to repair or replacement, at Dyne Systems' election, of such products. Dyne Systems assumes no risk and shall be subject to no liability for any damages or loss resulting from the specific use or application made of the Products. Dyne Systems' liability for any other claim, whether based on breach of contract, negligence or product liability, relating to the products shall not exceed the price paid by Buyer for such Products. In no event will Dyne Systems be liable for any special, incidental or consequential damages, including loss of use, loss of profit, claims of third parties, or damages arising from bodily injury, or death, however caused, whether by the negligence of Dyne Systems or otherwise.

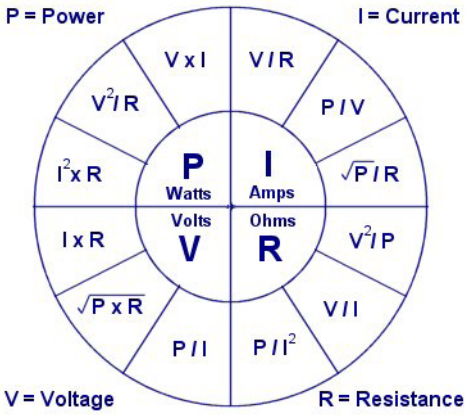
EQUIPMENT MADE BY OTHERS: Any items supplied that are not manufactured by Dyne Systems are covered by the original manufacturer's warranty and not by a Dyne Systems warranty.

BUYER SUPPLIED PRODUCT: Dyne Systems accepts Buyer provided equipment as a courtesy only. Dyne Systems is not responsible for determining suitability of Buyer's equipment for a particular purpose. Repair or configuration of Buyer-supplied equipment will be charged at Dyne Systems normal rate.

APPENDIX A: DEFINITIONS AND FORMULAS

OHM'S LAW

Ohm's Law defines the relationships between (P) power, (E) voltage, (I) current, and (R) resistance. One ohm is the resistance value through which one volt will maintain a current of one ampere.



APPENDIX B: ACRONYMS

°C – Degrees Centigrade

CW – Clockwise

CCW – Counter Clockwise

°F – Degrees Fahrenheit

GND - Ground

I/O – Input or Output

(i)- Input

(o) - Output

JP – Jumper

LCD – Liquid Crystal Display

LED – Light Emitting Diode

NC – Not Connected

NEC – National Electric Code

RTZ – Return To Zero

SSD – Soft Shutdown

VAC – Volts Alternating Current