

**WARNING<sup>1</sup>**

EACH 181 DC MOTOR CONTROLLER IS FACTORY-SET FOR 115VAC

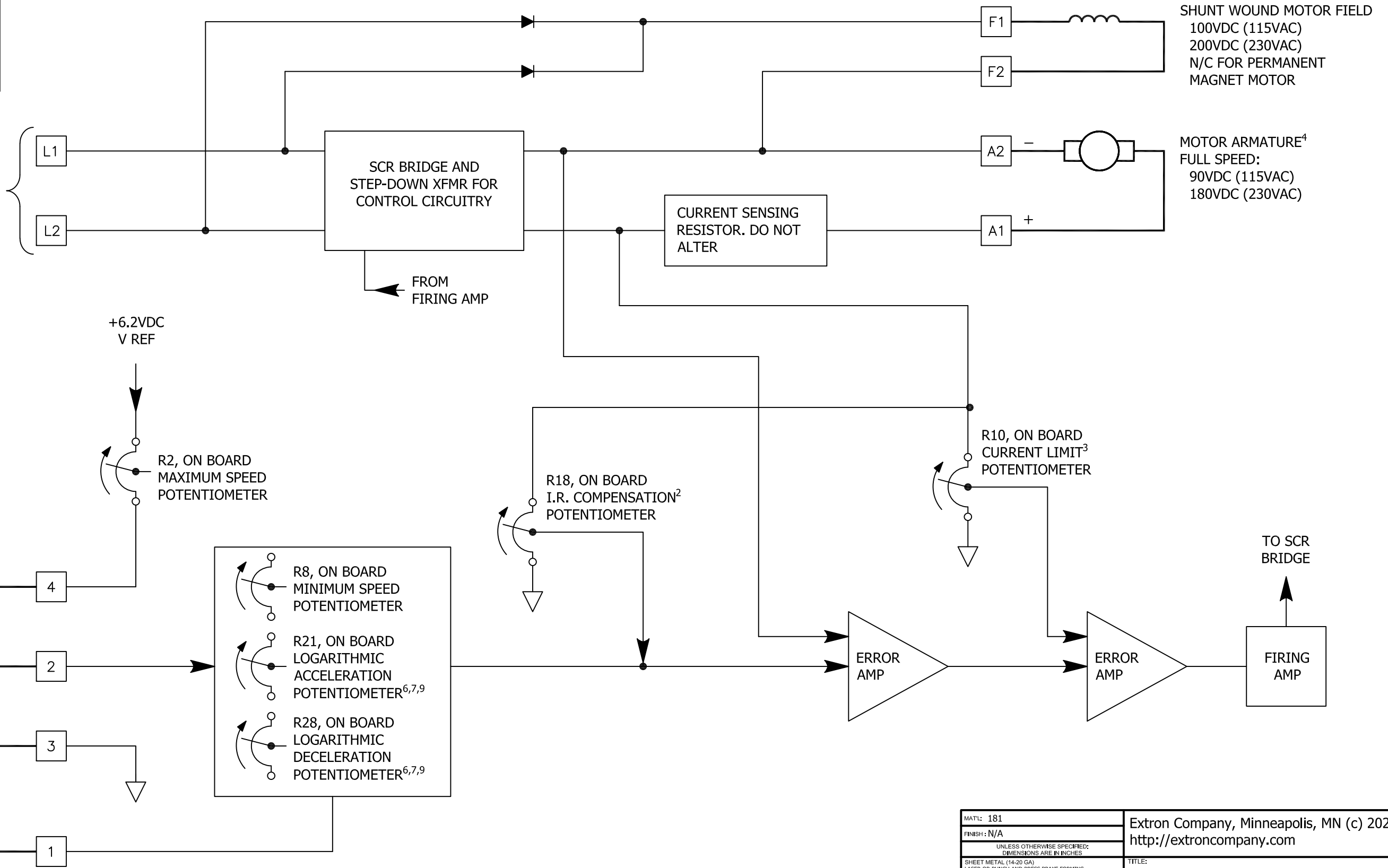
DO NOT POWER THE DRIVE UNTIL THE DRIVE'S CONFIGURATION (i.e. JUMPERS) AND SUPPLY VOLTAGE ARE MATCHED AND DRIVE'S HP RATING MATCHES THE MOTOR TO BE USED.

SEE FOOTNOTES ON SHEET 4 OF 4

REVISION HISTORY			
REV	DESCRIPTION	DATE	BY
E	ECO 20230502-PSG-001	5/2/2023	PSG

SUPPLY VOLTAGE  
115VAC: INSTALL W1, W5, W7  
230VAC: INSTALL W6, REMOVE W1  
50/60HZ

SUPPLY VOLTAGE WIRE SIZE RECOMMENDATIONS		
MOTOR CURRENT (DC AMPS)	MAX 50FT RUN	MAX 100FT RUN
to 3A	18AWG	16AWG
to 5A	16AWG	14AWG
>5A	14AWG	12AWG



FOR MAX SPEED ONLY: REPLACE POTENTIOMETER WITH CONDUCTOR (e.g. 16AWG stranded wire) CONNECTING TERMINALS 2 & 4<sup>8,9</sup>

CUST SUPPLIED: 5K POTENTIOMETER REQUIRED FOR VARIABLE SPEED CONTROL

CUST SUPPLIED, OPTIONAL: CONTACTOR, SWITCH, OR RELAY CLOSE TO DISABLE DRIVE<sup>5,6</sup>

MATL: 181	Extron Company, Minneapolis, MN (c) 2023 <a href="http://extroncompany.com">http://extroncompany.com</a>	
FINISH: N/A	TITLE: <b>BLOCK DIAGRAM, 181 DC DRIVE</b>	
UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES		
SHEET METAL (14-20 GA) LASER OR PUNCH AND PRESS BRAKE FORMING TOLERANCES:		
HOLE DIAMETER: ±0.003 SAME PLANE HOLE-TO-HOLE: ±0.010 SAME PLANE SHEAR EDGE-TO-HOLE: ±0.015 FORMED EDGE-TO-HOLE: ±0.015 ANGULAR: ±1°		
3rd ANGLE PROJECTION	UNLESS SUPERSEDED BY THE ABOVE	DWG NO: <b>P18190100</b>
	.X ± 0.1 .XX ± 0.03 .XXX ± 0.015	REV: <b>E</b>
DO NOT SCALE DRAWING	SCALE: 1:1	DWG SIZE: B SHEET 1 OF 4

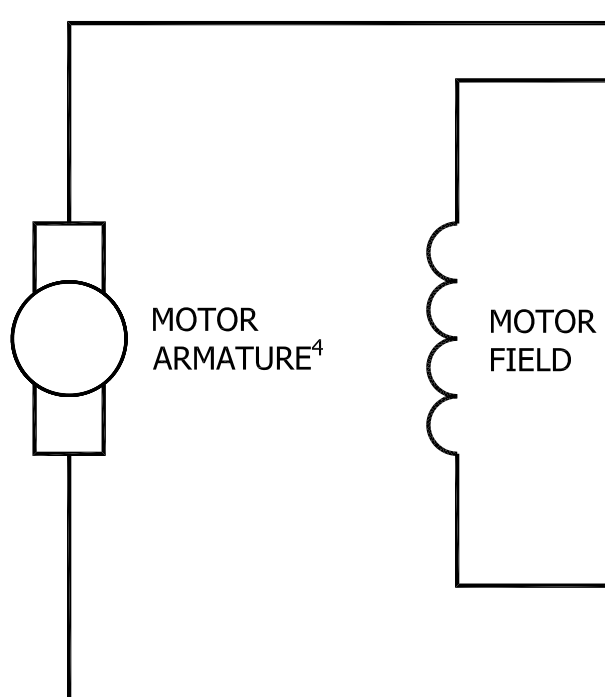
**WARNING<sup>1</sup>**

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115/230VAC,  
50-60HZ  
1PH INPUT  
VERIFY  
JUMPERS<sup>1</sup>

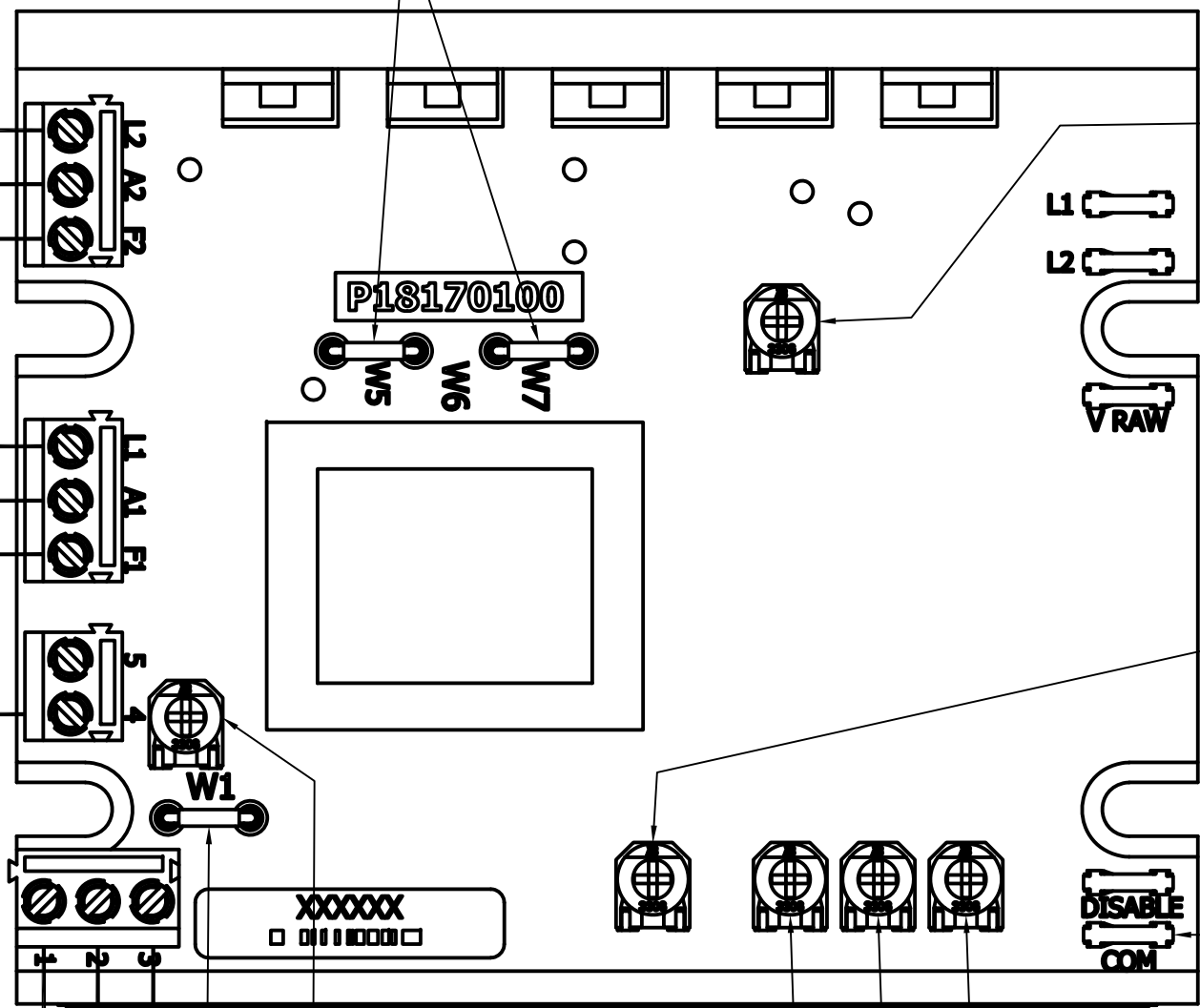
SET JUMPERS:  
- W5 & W7 INSTALLED  
FOR 115VAC OPERATION  
- W6 INSTALLED  
FOR 230VAC OPERATION<sup>1</sup>

FIELD: FULL WAVE  
RECTIFICATION SHOWN



MOTOR  
ARMATURE<sup>4</sup>

MOTOR  
FIELD



R18 I.R. COMPENSATION POT<sup>2</sup>

R8 MINIMUM  
SPEED POT

5X CONNECTOR RECEPTACLES  
ACCEPT CONNECTION TO  
MODULES THAT EXPAND  
FUNCTIONALITY  
(eg. FEEDBACK AND REVERSING)

R28 LOGARITHMIC  
DECELERATION POT<sup>6,7,9</sup>

R21 LOGARITHMIC  
ACCELERATION POT<sup>6,7,9</sup>

R10 CURRENT  
LIMIT POT<sup>3</sup>

R2 MAXIMUM  
SPEED POT

SET JUMPER:  
- W1 INSTALLED FOR 115VAC  
OPERATION  
- W1 REMOVED / NOT INSTALLED  
FOR 230VAC OPERATION<sup>1</sup>

CLOSE TO  
DISABLE DRIVE<sup>5,6</sup>

5K SPEED POT

SEE FOOTNOTES ON SHEET 4 OF 4

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3rd ANGLE PROJECTION UNLESS SUPERSEDED BY THE ABOVE X ± 0.1 .XX ± 0.03 .XXX ± 0.015	SCALE: 1.5:1 DWG SIZE: B SHEET 2 OF 4
DO NOT SCALE DRAWING	

**WARNING<sup>1</sup>**

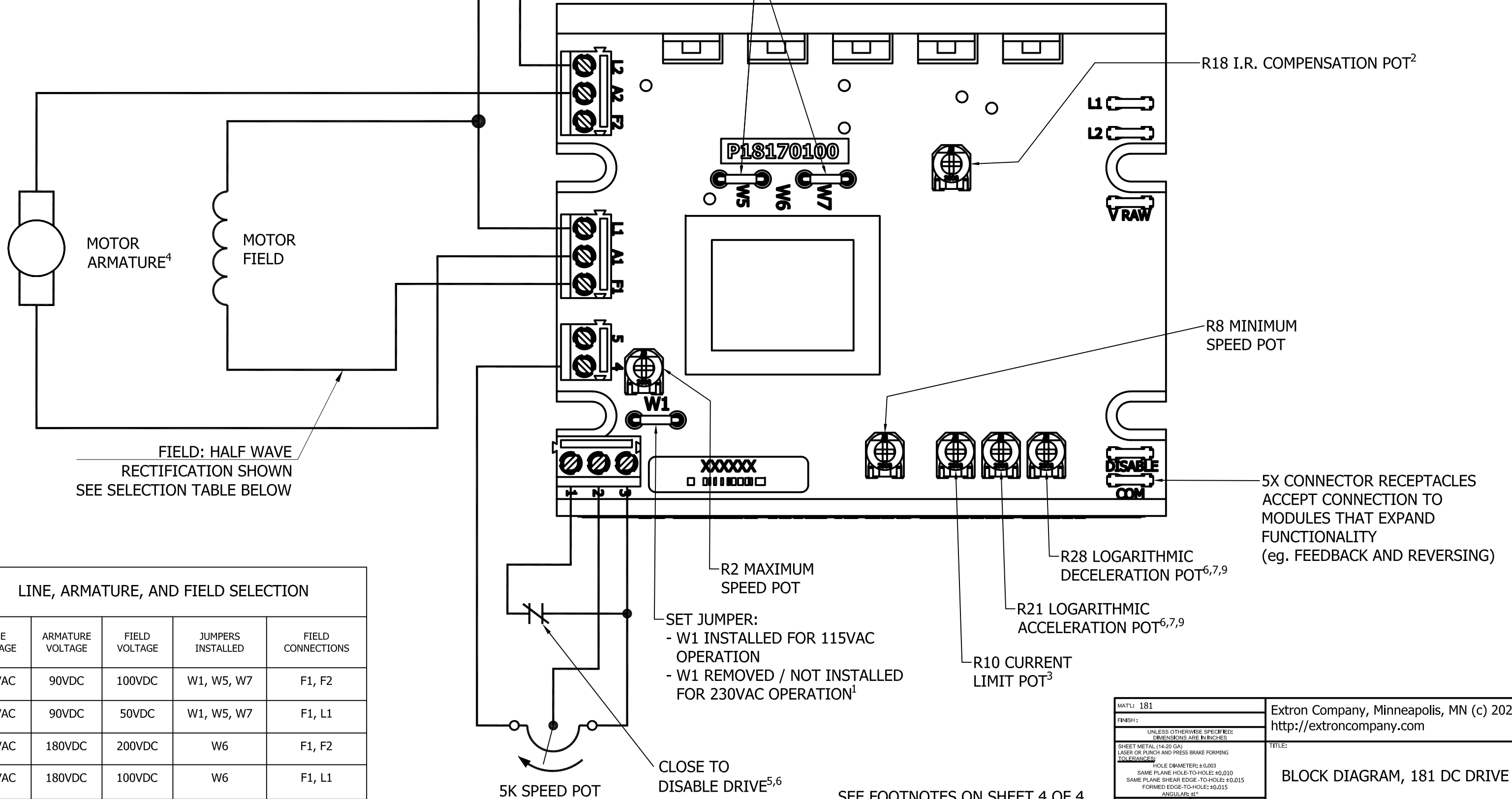
EACH 181 DC MOTOR CONTROLLER IS  
FACTORY-SET FOR 115VAC

115/230VAC,  
50-60HZ  
1PH INPUT  
VERIFY  
JUMPERS<sup>1</sup>

L1 L2

**SET JUMPERS:**

- W5 & W7 INSTALLED  
FOR 115VAC OPERATION
- W6 INSTALLED  
FOR 230VAC OPERATION<sup>1</sup>



FIELD: HALF WAVE  
RECTIFICATION SHOWN  
SEE SELECTION TABLE BELOW

**LINE, ARMATURE, AND FIELD SELECTION**

LINE VOLTAGE	ARMATURE VOLTAGE	FIELD VOLTAGE	JUMPERS INSTALLED	FIELD CONNECTIONS
115VAC	90VDC	100VDC	W1, W5, W7	F1, F2
115VAC	90VDC	50VDC	W1, W5, W7	F1, L1
230VAC	180VDC	200VDC	W6	F1, F2
230VAC	180VDC	100VDC	W6	F1, L1
230VAC	90VDC	100VDC	W1, W6	F1, L1

- SET JUMPER:**
- W1 INSTALLED FOR 115VAC OPERATION
  - W1 REMOVED / NOT INSTALLED FOR 230VAC OPERATION<sup>1</sup>

SEE FOOTNOTES ON SHEET 4 OF 4

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3rd ANGLE PROJECTION UNLESS SUPERSEDED BY THE ABOVE	SCALE: 1.5:1 DWG SIZE: B SHEET 3 OF 4

Footnotes:

1 WARNING

EACH 181 DC MOTOR CONTROLLER IS FACTORY-SET FOR 115VAC. DO NOT POWER THE DRIVE UNTIL THE DRIVE'S CONFIGURATION (i.e. JUMPERS) AND SUPPLY VOLTAGE ARE MATCHED AND DRIVE'S HP RATING MATCHES THE MOTOR TO BE USED.

2 181 DC Drive applies the IR compensation method to provide speed regulation to a DC motor. An increase in load will cause a decrease in speed. IR compensation increases the voltage to the motor, thus compensating for changes in load, to maintain a constant speed at the end user's setting.

3 The current limit (or torque adjustment) potentiometer protects both the motor and the 181 DC Drive against overloads. Factory set to nameplate rating of the 181 DC Drive

4 The 181 includes a snubber network, placed immediately adjacent to the motor connections A1 and A2, to suppress voltage transients. And there is a commutating (freewheeling) diode in the bridge rectification power module to provide a path for current during phase back operation, and to help minimize DC output ripple. The 181 includes these features to properly handle the motor's inductive load.

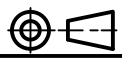
5 Shorting 1 and 3 does not initiate a ramp-down that is controlled by the DECEL pot. Rather, shorting 1 and 3 shuts down the gates and immediately sets armature voltage to 0VDC; it truly disables the output. The approach originally conceived here would allow an E-STOP input to immediately shut down the motor.

6 Opening 1 and 3: If 2 and 4 are shorted, the motor's RPM ramp-up to full speed follows the ACCEL pot. If an external speed pot is in use, the motor's RPM ramp-up to the external speed pot's speed setting follows the ACCEL pot. When the external speed pot is wired in, if a user quickly turns the external speed pot's settings to 0VDC, the motor's RPM ramp-down to 0RPM follows the DECEL pot.

7 The ACCEL and DECEL pots are intended to work in conjunction with the external speed pot. The ACCEL and DECEL pots provide an adjustable ramp-up and ramp-down (respectively) of the motor's RPM that essentially prevents the human actor from turning the external speed pot setting up or down more quickly than would be desired by the application. ACCEL: if the external speed pot is quickly turned from 0 to 100 (full speed) by human action, the motor will follow the ramp-up prescribed by the ACCEL speed pot and will achieve a maximum speed to the external speed pot setting. DECEL: if the external speed pot is quickly turned from 100 to 0, the motor will follow the ramp-down prescribed by the DECEL speed pot. The DECEL pot is not a factor in the motor's performance when the 181 is disabled. The only circumstances under which the DECEL pot plays a part of the motor's deceleration, is when the external speed pot is turned down more quickly than the log curve prescribed by the DECEL pot's setting (RC).

8 Simultaneously shorting 2 and 4 and 2 and 3 will short the drive.

9 When 2 and 4 are shorted, the motor's RPM ramp-up to full speed follows the ACCEL pot. When 2 and 3 are shorted, the motor's RPM ramp-up to the MIN SPEED pot follows the ACCEL pot.

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DO NOT SCALE DRAWING		