SERVICE BULLETIN

Carrier Corporation

Number: C0313 (Revision 1) **Date:** 10/13/05 **Supersedes**: 8/25/2003

Title: Replacing an IQ-1000 Motor Protection Relay with an MP-3000 Relay

Author: Ted Libera **Dept**: CCS Technical Support

Category: General

MODELS AFFECTED:

17 & 19 Series chillers with PIC I controls and Cutler-Hammer Starters.

SITUATION:

From the mid-1990's until PIC II controls eliminated the need for overload relays in the starter, Cutler-Hammer used the IQ-1000 Motor Protection Relay as the overload device in the starters it supplied to Carrier. Because this device has many features other than overload protection, configuration information was published in bulletin C9632.

The IQ-1000 is no longer in production and has been replaced by the MP-3000 Motor Protection Relay. As with the IQ-1000, it has many functions, which must be configured. This bulletin gives the recommended configuration settings for that device. More complete information can be found in the manual packed with the MP-3000 relay and which can be downloaded as a PDF file from the Cutler-Hammer website.

WHEN ORDERING AN MP-3000

The MP-3000 is available for use with current transformers having a nominal secondary current of either 5 amperes or 1 ampere. It is most likely that the current transformers in the starter will have a 5 amp secondary but it should be confirmed before ordering the relay.

For reliable motor protection with a 5 ampere CT set, the CT must deliver between 2.5 and 4 amperes at 100% RLA. For example, a 400:5 CT and 300 amps RLA: 300 amps x 5/400 = 3.75 amperes.

With a 1 ampere CT set, the CT must deliver between 0.5 and 0.8 amperes at 100% RLA. With a 400:1 CT and a 300 RLA motor: 300 x 1/400 = 0.75 amps.

INSTALLATION :

The connections between the starter and the MP-3000 are on the back of the MP-3000 and when it is installed in the starter, opening the starter enclosure door can access them. You will find that the terminal numbers used on the MP-3000 are the same as used on the IQ-1000 so changing wires from one to the other should be straightforward.

The IQ 1000 had a dedicated output assigned for the transition function and a discrete input assigned for incomplete sequence on transition. The MP-3000's inputs and outputs are user configurable for a variety of functions. If the Transition and Incomplete Sequence functions are enabled, then the input and output corresponding to the IQ 1000 configuration is assigned to these functions exclusively. These setting will keep the same wiring connections when replacing the IQ-1000 with an MP-3000

If the ground fault protection feature of the MP-3000 is used, terminals 15 and 16 are used as the ground fault trip contacts. Normally, they would be wired in series with the main trip contacts (terminals 12 & 13)

The alarm contacts are not used.

Terminals for the current transformers are located at the top rear of the MP-3000. The running current CT's are the leftmost six terminals and the ground fault CT connects to the right two terminals. The ratio of the current transformers should be given to the vendor when the relay is ordered.

On the IQ-1000 you will find a 25Ω resistor between terminals 24 and 25. This resistor must be moved to the MP-3000 terminals 24 and 25. It converts a 4-20mA output to a voltage output that can be read by the SMM. It is the PIC motor current input.

Terminal 24 of the MP-3000 must connect to terminal 21 of the SMM and terminal 25 of the MP-3000 must connect to terminal 22 of the SMM.

Power to the MP-3000 is applied at terminals 4 (120/240 vac) and terminal 7 (neutral). Be careful not to connect to terminal 6. That is a 120vac source FROM the MP-3000 to read contacts connected to its discrete inputs. It is a 120 source whether 120 or 240 volts power the MP-3000.

Programming:

Open the security door on the front of the MP-3000 and press the **Prog** button to put the relay into Program mode. The programming worksheet (filled in) follows in this bulletin to provide the configurations to enter. Use the Page and Line pushbuttons to navigate through the Program

mode, and the Value pushbuttons to change the setting values. You can see the page and line positions of the configurations on the worksheet.

The Help pushbutton provides a scrolling explanation of the displayed message, including units of measure, for any of the messages from the MP-3000.

It is Carrier policy to program the relay so that it cannot be reprogrammed while the motor is running. Line 6 of page 12 should be set to STOP PGM for this reason.

CALIBRATION OF THE PIC CONTROL:

The Motor Current Setting on the chiller LID panel must be calibrated at two points: both with the machine not running and with the machine running at 70-100% RLA. This calibration must be performed because the MP-3000 creates a 4-20 mA signal, which must be converted (by RES1 25 Ohm resistor) to 0.1 to 0.5 volts to supply the proper signal to the SMM.

Some of the first 19XR/XRT chillers were shipped with Cutler-Hammer starters equipped with a 0.15 Ohm resistor (RES2, which is connected across terminals 21 and 22 by a 1M auxiliary contact as shown in Figure 1). The purpose of RES2 was to drop the voltage to the SMM to 0 so a Shunt Trip was not initiated. If this resistor is present, it must be removed from the circuit before calibration. It can be eliminated because after zero point calibration the PIC will interpret 0.1 volts as zero amps. The final production diagram with RES2 removed is shown in Figure 2.

Zero Point calibration:

Step 1. Make sure that the compressor rated load amps in the Service1 table is correct.

Step 2. Enter the Status1 table, highlight the amps value, and press SELECT. Press INCREASE or DECREASE to bring the amps value on the LID to 0. Press ENTER on the LID when completed.

Range Point calibration (performed with machine running):

Proceed according to the amps calibration procedure in the Start-Up Operation and Maintenance Instructions for the chiller.

NOTES:

1. (Program page 1, line 5 & 6) All displayed information is the same for either of the two types of MP-3000 relays. When CT ratios are to be set, the value entered is the *numerator* of the main

CT ratio. The denominator is assumed to be 5 or 1, depending on the rating of the CTs and relay in use.

For example, a set of three 400:5 CT's might be used with an MP-3000 specified for 5A CTs. The phase CT ratio is then set to 400. Alternatively, a set of three 400:1 CTs could be used with an MP-3000 rated for 1 A CTs. Use a setting of 400 for this case as well.

2. (Program page 3, line 1) THE GROUND FAULT TRIP SETTING DOES NOT USE RLA AS THE BASIS FOR THE SETTING. This is different from the PIC controls, which do use RLA as the basis for this setting.

   The Ground Fault Trip Level is set in percent of the ground CT numerator (CT rated primary current). For example, with a 50:5 ground fault CT and a setting of 24%, the GFT function will pick up at 24% of 50A or 12A actual ground fault current. The start and/or delays must expire before the trip occurs.

3. (Program page 3, line 4) If the starter is equipped with a circuit breaker set to OFF. Other wise set it to the lower of 1600% or (1020*PCT/RLA) where PCT is the Phase CT Ratio numerator (program page 1, line 5)

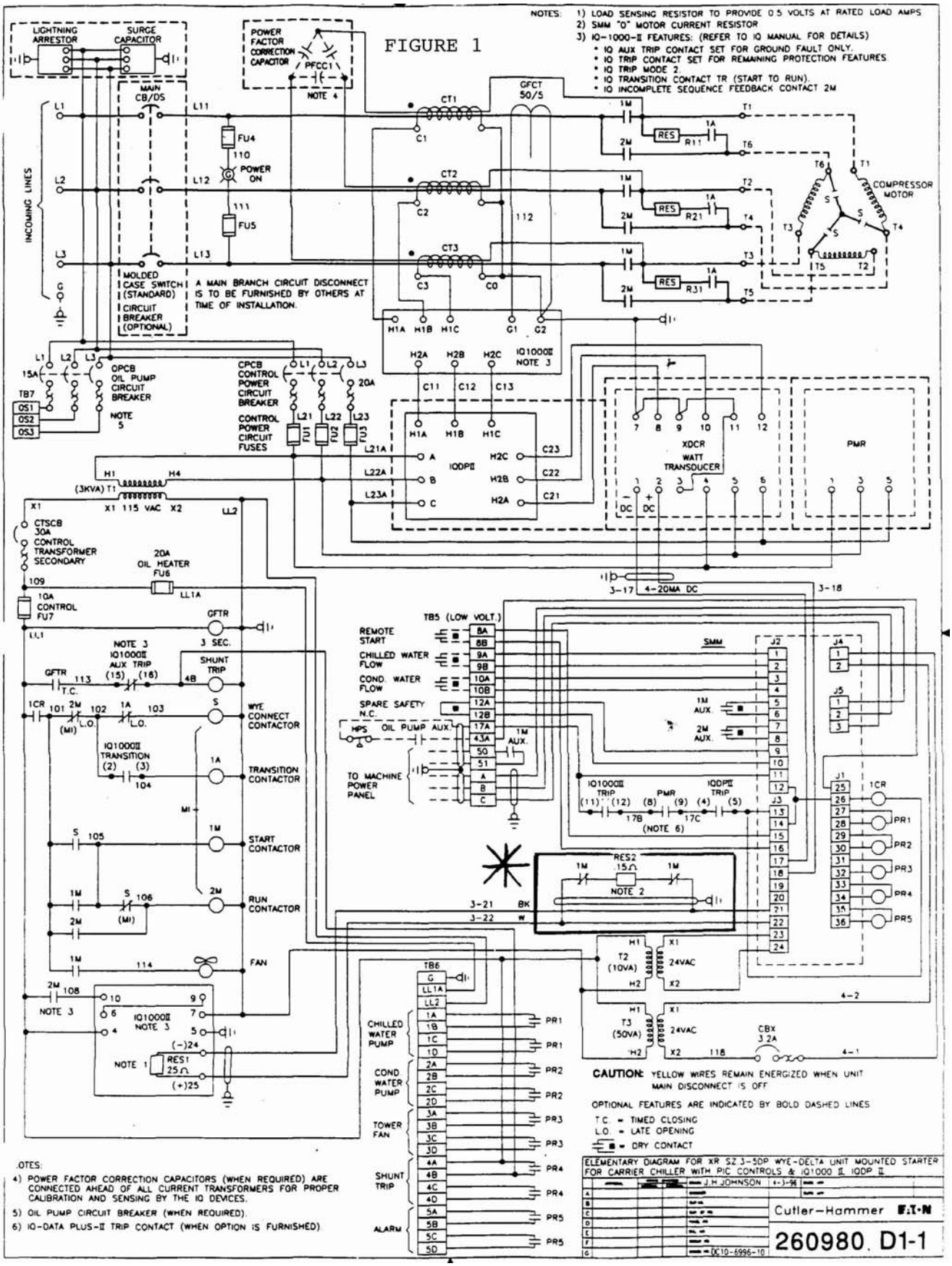
FIGURE 1
NOTES:
1) LOAD SENSING RESISTOR TO PROVIDE 0.5 VOLTS AT RATED LOAD AMPS
2) SMM "0" MOTOR CURRENT RESISTOR
3) IQ-1000-II FEATURES: (REFER TO IQ MANUAL FOR DETAILS)
* IQ AUX TRIP CONTACT SET FOR GROUND FAULT ONLY.
* IQ TRIP CONTACT SET FOR REMAINING PROTECTION FEATURES.
* IQ TRIP MODE 2.
* IQ TRANSITION CONTACT TR (START TO RUN).
* IQ INCOMPLETE SEQUENCE FEEDBACK CONTACT 2M
LIGHTNING ARRESTOR
SURGE CAPACITOR
POWER FACTOR CORRECTION CAPACITOR
PFCC1
NOTE 4
MAIN CB/DS
INCOMING LINES
L1
L2
L3
G
L11
L12
L13
FU4
110
POWER ON
111
FU5
CT1
CT2
CT3
GFCT 50/5
C1
C2
C3
C0
112
1M
2M
RES
R11
R21
R31
1A
T1
T2
T3
T4
T5
T6
COMPRESSOR MOTOR
S
MOLDED CASE SWITCH (STANDARD)
CIRCUIT BREAKER (OPTIONAL)
A MAIN BRANCH CIRCUIT DISCONNECT IS TO BE FURNISHED BY OTHERS AT TIME OF INSTALLATION.
H1A H1B H1C G1 G2
H2A H2B H2C IQ1000II NOTE 3
C11 C12 C13
15A
OPCB OIL PUMP CIRCUIT BREAKER
TB7
OS1
OS2
OS3
NOTE 5
CPCB CONTROL POWER CIRCUIT BREAKER
20A
CONTROL POWER CIRCUIT FUSES
L21
L22
L23
FU1
FU2
FU3
L21A
L22A
L23A
IQDPII
C23
C22
C21
XDCR WATT TRANSDUCER
PMR
DC
(3KVA) T1
H1
H4
X1
X1 115 VAC X2
LL2
CTSCB 30A CONTROL TRANSFORMER SECONDARY
20A OIL HEATER FU6
109
LL1A
10A CONTROL FU7
LL1
GFTR
3 SEC.
NOTE 3 IQ1000II AUX TRIP
(15)
(16)
SHUNT TRIP
48
GFTR 113 T.C.
1CR
101
2M
102
1A
103
L.O.
(MI)
S
WYE CONNECT CONTACTOR
IQ1000II TRANSITION
(2)
(3)
104
TRANSITION CONTACTOR
105
START CONTACTOR
106
RUN CONTACTOR
114
FAN
108
NOTE 3
IQ1000II NOTE 3
(-)24
(+)25
NOTE 1
RES1 25Ω
TB5 (LOW VOLT.)
REMOTE START
CHILLED WATER FLOW
COND. WATER FLOW
SPARE SAFETY N.C.
HPS
OIL PUMP AUX.
TO MACHINE POWER PANEL
8A
8B
9A
9B
10A
10B
12A
12B
17A
43A
50
51
A
B
C
SMM
1M AUX.
2M AUX.
J1
J2
J3
J4
J5
IQ1000II TRIP
IQDPII TRIP
PMR
17B
17C
(NOTE 6)
1CR
PR1
PR2
PR3
PR4
PR5
RES2 .15Ω
NOTE 2
3-21 BK
3-22 W
T2 (10VA)
T3 (50VA)
24VAC
X2
H2
4-2
4-1
CBX 3.2A
118
TB6
LL1A
LL2
CHILLED WATER PUMP
COND. WATER PUMP
TOWER FAN
SHUNT TRIP
ALARM
1A
1B
1C
1D
2A
2B
2C
2D
3A
3B
3C
3D
4A
4B
4C
4D
5A
5B
5C
5D
3-17 4-20MA DC 3-18
CAUTION: YELLOW WIRES REMAIN ENERGIZED WHEN UNIT MAIN DISCONNECT IS OFF
OPTIONAL FEATURES ARE INDICATED BY BOLD DASHED LINES
T.C. = TIMED CLOSING
L.O. = LATE OPENING
= DRY CONTACT
NOTES:
4) POWER FACTOR CORRECTION CAPACITORS (WHEN REQUIRED) ARE CONNECTED AHEAD OF ALL CURRENT TRANSFORMERS FOR PROPER CALIBRATION AND SENSING BY THE IQ DEVICES.
5) OIL PUMP CIRCUIT BREAKER (WHEN REQUIRED).
6) IQ-DATA PLUS-II TRIP CONTACT (WHEN OPTION IS FURNISHED)
ELEMENTARY DIAGRAM FOR XR SZ 3-5DP WYE-DELTA UNIT MOUNTED STARTER FOR CARRIER CHILLER WITH PIC CONTROLS & IQ1000 II, IQDP II
J.H JOHNSON 1-3-96
Cutler-Hammer E·T·N
260980. D1-1

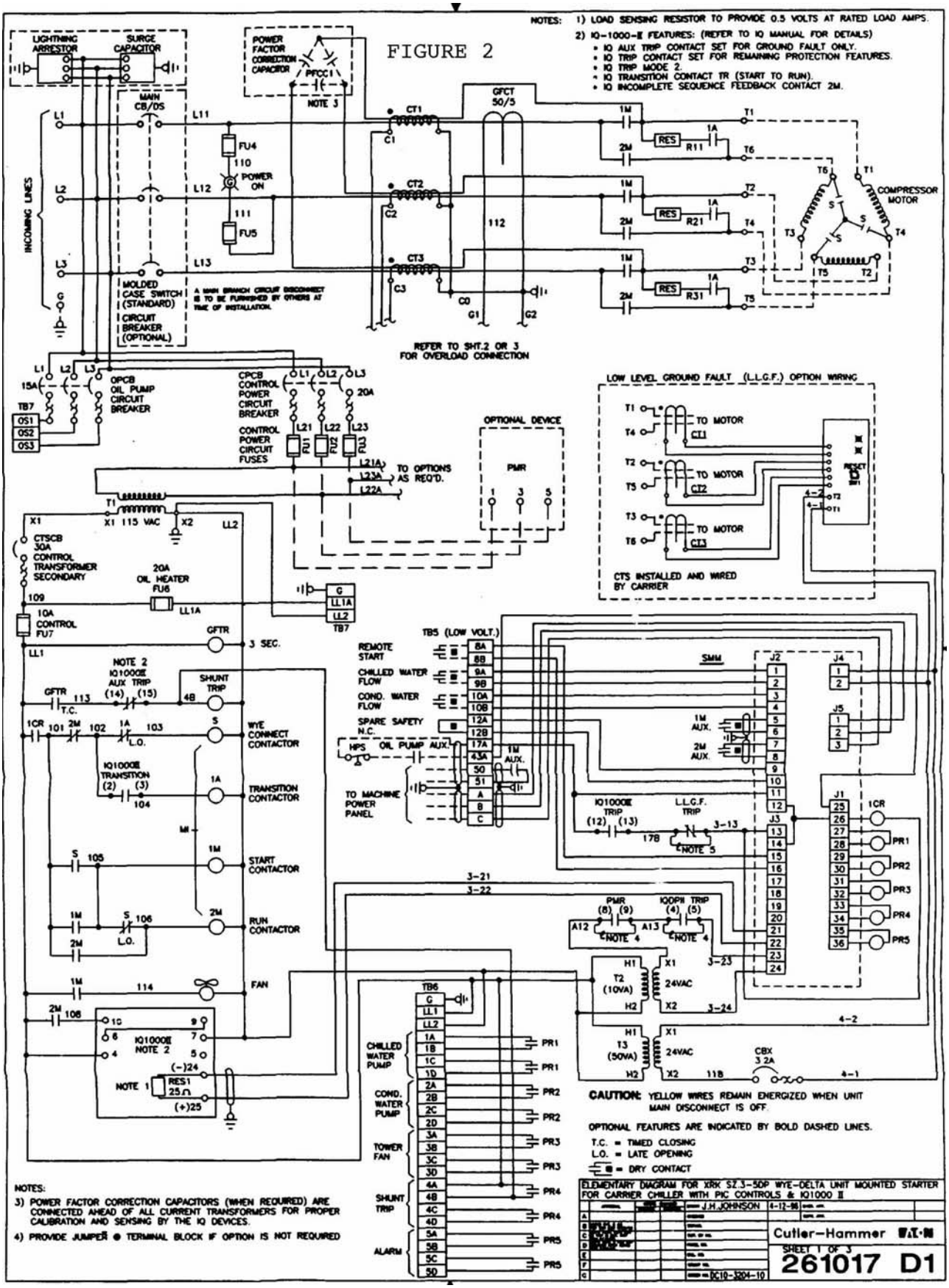
FIGURE 2
NOTES: 1) LOAD SENSING RESISTOR TO PROVIDE 0.5 VOLTS AT RATED LOAD AMPS.
2) IQ-1000-II FEATURES: (REFER TO IQ MANUAL FOR DETAILS)
• IQ AUX TRIP CONTACT SET FOR GROUND FAULT ONLY.
• IQ TRIP CONTACT SET FOR REMAINING PROTECTION FEATURES.
• IQ TRIP MODE 2.
• IQ TRANSITION CONTACT TR (START TO RUN).
• IQ INCOMPLETE SEQUENCE FEEDBACK CONTACT 2M.
LIGHTNING ARRESTOR
SURGE CAPACITOR
POWER FACTOR CORRECTION CAPACITOR
PFCC1
NOTE 3
MAIN CB/DS
INCOMING LINES
L1
L2
L3
G
L11
L12
L13
FU4
110
POWER ON
111
FU5
CT1
CT2
CT3
C1
C2
C3
C0
G1
G2
GFCT 50/5
112
1M
2M
1A
RES
R11
R21
R31
T1
T2
T3
T4
T5
T6
COMPRESSOR MOTOR
S
MOLDED CASE SWITCH (STANDARD)
CIRCUIT BREAKER (OPTIONAL)
A MAIN BRANCH CIRCUIT DISCONNECT IS TO BE FURNISHED BY OTHERS AT TIME OF INSTALLATION.
REFER TO SHT.2 OR 3 FOR OVERLOAD CONNECTION
OPCB OIL PUMP CIRCUIT BREAKER
15A
TB7
OS1
OS2
OS3
CPCB CONTROL POWER CIRCUIT BREAKER
20A
CONTROL POWER CIRCUIT FUSES
FU1
FU2
FU3
L21
L22
L23
L21A
L23A
L22A
TO OPTIONS AS REQ'D.
OPTIONAL DEVICE
PMR
LOW LEVEL GROUND FAULT (L.L.G.F.) OPTION WIRING
TO MOTOR
CT1
CT2
CT3
CTS INSTALLED AND WIRED BY CARRIER
CTSCB 30A CONTROL TRANSFORMER SECONDARY
X1
X2
X1 115 VAC
LL2
20A OIL HEATER FU6
LL1A
109
10A CONTROL FU7
LL1
GFTR
3 SEC.
NOTE 2
IQ1000II AUX TRIP
(14)
(15)
SHUNT TRIP
48
T.C.
113
1CR
101
2M
102
1A
103
L.O.
S
WYE CONNECT CONTACTOR
IQ1000II TRANSITION
(2)
(3)
104
TRANSITION CONTACTOR
M
1M
START CONTACTOR
105
106
RUN CONTACTOR
114
FAN
IQ1000II NOTE 2
(-)24
(+)25
RES1 25Ω
NOTE 1
TB5 (LOW VOLT.)
REMOTE START
CHILLED WATER FLOW
COND. WATER FLOW
SPARE SAFETY N.C.
HPS
OIL PUMP AUX.
TO MACHINE POWER PANEL
8A
8B
9A
9B
10A
10B
12A
12B
17A
43A
50
51
A
B
C
SMM
J2
J4
J5
J1
J3
1M AUX.
2M AUX.
IQ1000II TRIP
(12)
(13)
L.L.G.F. TRIP
178
NOTE 5
3-13
1CR
PR1
PR2
PR3
PR4
PR5
3-21
3-22
PMR
(8)
(9)
IQOPII TRIP
(4)
(5)
A12
A13
NOTE 4
3-23
H1
X1
T2 (10VA)
24VAC
H2
X2
3-24
T3 (50VA)
CBX 3.2A
118
4-1
4-2
TB6
CHILLED WATER PUMP
COND. WATER PUMP
TOWER FAN
SHUNT TRIP
ALARM
CAUTION: YELLOW WIRES REMAIN ENERGIZED WHEN UNIT MAIN DISCONNECT IS OFF.
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T.C. = TIMED CLOSING
L.O. = LATE OPENING
= DRY CONTACT
NOTES:
3) POWER FACTOR CORRECTION CAPACITORS (WHEN REQUIRED) ARE CONNECTED AHEAD OF ALL CURRENT TRANSFORMERS FOR PROPER CALIBRATION AND SENSING BY THE IQ DEVICES.
4) PROVIDE JUMPER ● TERMINAL BLOCK IF OPTION IS NOT REQUIRED
ELEMENTARY DIAGRAM FOR XRX SZ.3-5DP WYE-DELTA UNIT MOUNTED STARTER FOR CARRIER CHILLER WITH PIC CONTROLS & IQ1000 II
J.H.JOHNSON
4-12-96
Cutler-Hammer
SHEET 1 OF 3
261017 D1
DC10-3204-10

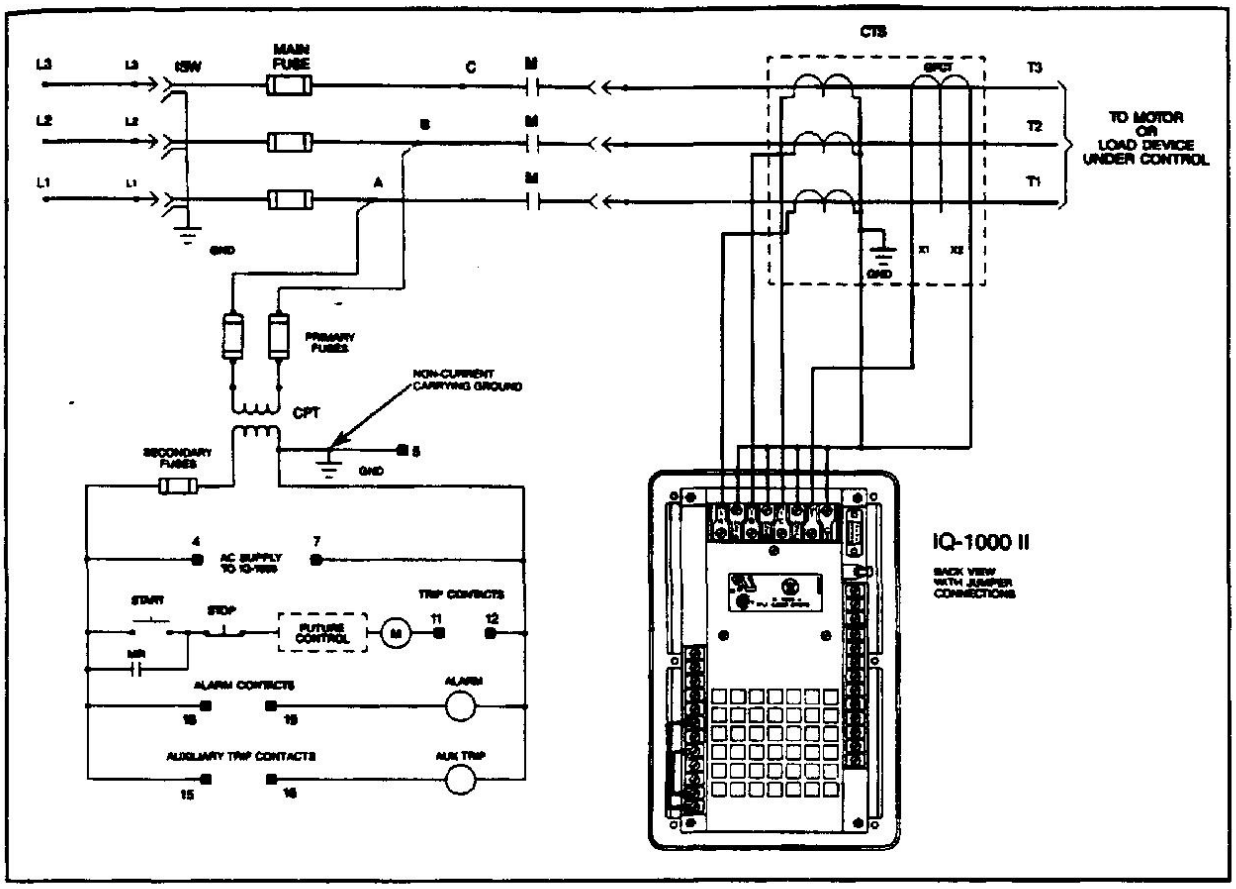
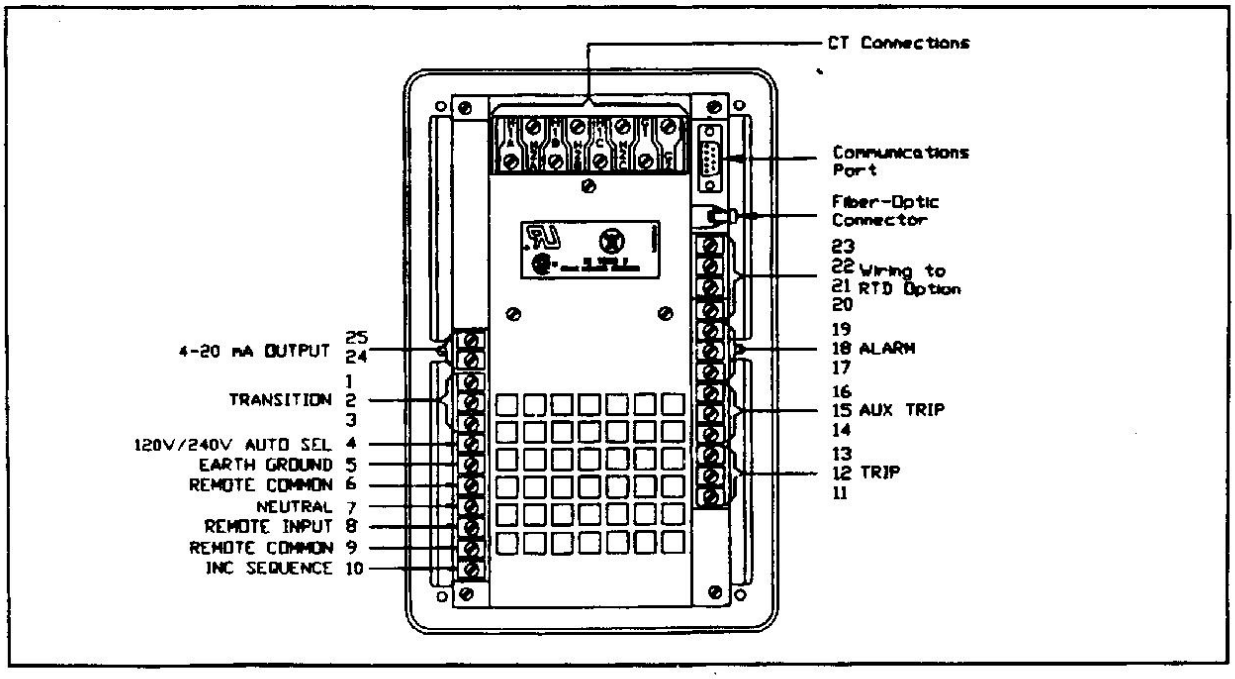
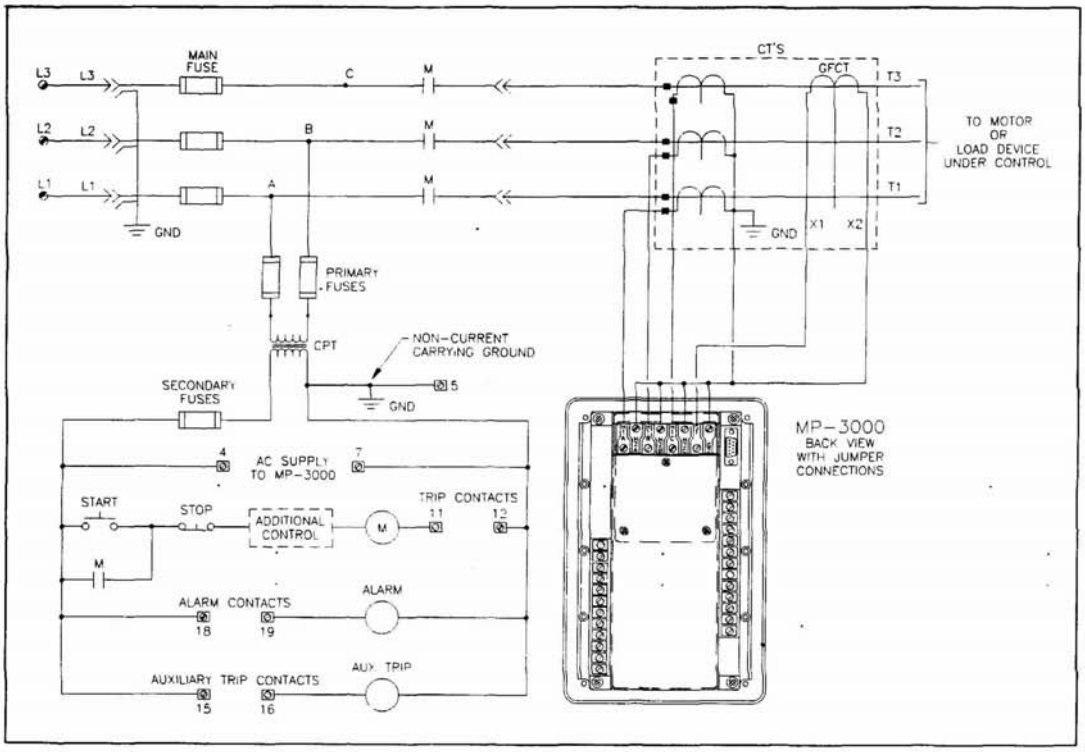


Figure 3 — Wiring Plan Drawing (partial plan)

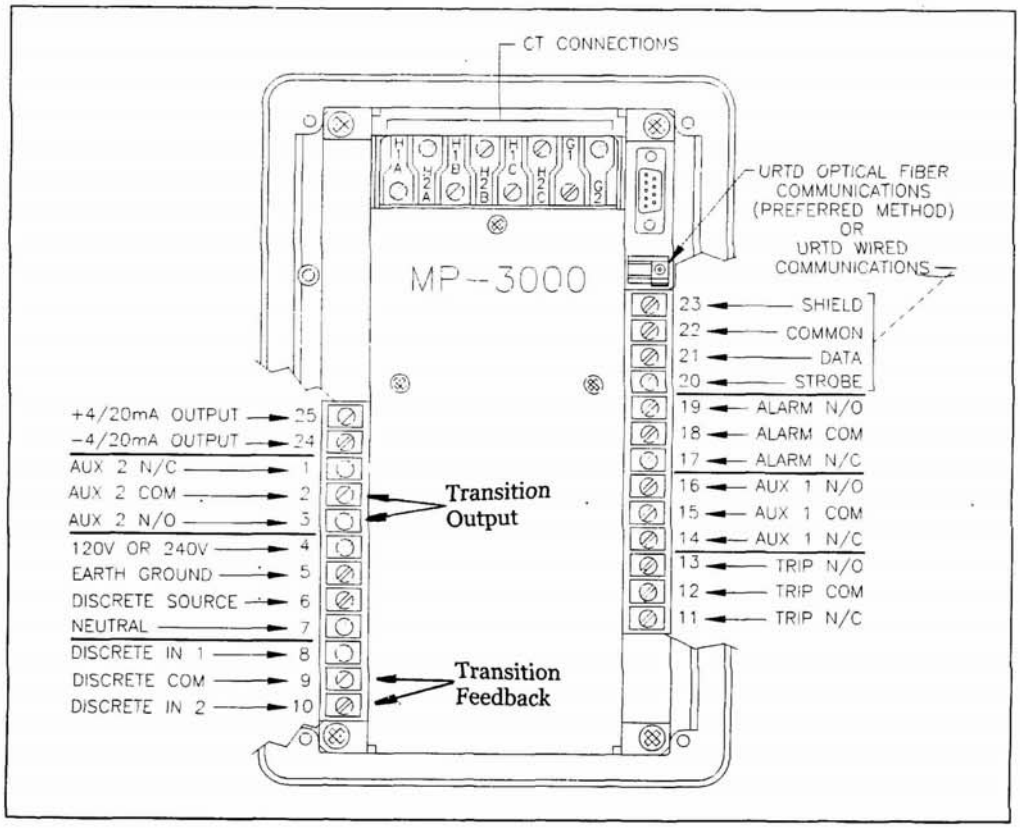


— IQ-1000 II Rear Panel Terminals



Typical Ct Circuits and Motor Control Wiring

Figure 4



The following data is presented in the same order as in the Settings/Mode Worksheet as found in the MP-3000 Instruction Book.

VOLTS = Motor Nameplate voltage

FLA = Nameplate Rated Load Amps

LRC= Nameplate Locked Rotor Current at Delta

Line No.	*Display*	*Help Message*	*Selected Value*
Page 1	**SP MOTOR**	**SP MOTOR SETTINGS FOR MOTOR CONSTANTS**	
1	FLA XXX	FULL LOAD AMPS	**RLA**
2	LRC XXXX	LOCKED ROTOR CURRENT % OF FLA	**(LRAD/LRA)/ 100**
3	LRT XXX	MAXIMUM ALLOWABLE STALL TIME IN SECONDS	**5**
4	UTC XXX	ULTIMATE TRIP CURRENT IN % FLA	**108**
5	PCT XXX	PHASE CT NUMERATOR IN PRIMARY AMP	**See note 1**
6	GCT XXXX	GROUND CURRENT RATIO NUMERATOR IN PRIMARY AMP	**See note 1**
7	FREQ XX	50 OR 60 HERTZ LINE FREQUENCY	**PER LOCATION**
8	REV OR NON-REV	REVERSING OR NON REVERSING STARTER	**NONREV**
Page 2	**SP RTD**	**SETTINGS FOR RTD INPUTS**	
1	RTD IN C RTD IN F	DISPLAYED IN DEGREES C OR F	**NON APPLICABLE**
2	WD T XXX	WINDING TEMP TRIP	**OFF**
3	WD A XXX	WINDING TEMP ALARM	**OFF**
4	MB T XXX	MOTOR BEARING TRIP	**OFF**
5	MB A XXX	MOTOR BEARING ALARM	**OFF**
6	LB T XXX	LOAD BEARING TRIP	**OFF**
7	LB A XXX	LOAD BEARING ALARM	**OFF**
8	AX T XXX	AUXILIARY TRIP	**OFF**
9	AX A XXX	AUXILIARY ALARM	**OFF**
10	DIAG ON DIAG OFF	ALARM ON FAILURE DIAGNOSTIC	**DIAG OFF**

Page 3	**SP TRIP**	**SETTINGS FOR TRIP EVENTS**	
1	GFT XXX	GROUND FAULT TRIP LEVEL IN % OF GROUND CT RATIO NUMERATOR	**24%** **See note 2**
2	GFSD XX	GROUND FAULT START DELAY IN CYCLES	**5**
3	GFRD XX	GROUND FAULT RUN DELAY IN CYCLES	**5**
4	IOC XXXX	INSTANTANEOUS OVERCURRENT IN % FLA	**See note 3**
5	IOCSD XX	INSTANTANEOUS OVERCURRENT START DELAY IN CYCLES	**2**
6	JMT XXX	JAM TRIP LEVEL IN % FLA	**OFF**
7	JMSD XXX	JAM TRIP AND ALARM START DELAY IN SECONDS	**1200**
8	JMTR XXX	JAM TRIP RUN DELAY IN SECONDS	**240**
9	ULT XXX	UNDERLOAD TRIP LEvEL IN % FLA	**OFF**
10	ULSD XXX	UNDERLOAD TRIP AND ALARM STAART DELAY IN SECONDS	**60**
11	ULTR XXX	UNDERLOAD TRIP RUN DELAY IN SECONDS	**11**
12	UBT XXX	PHASE UNBALANCE TRIP LEVEL	**20%**
13	UBSD XXX	PHASE UNBALANCE TRIP AND ALARM START DELAY IN SECONDS	**5**
14	UBTR XXX	PHASE UNBALANCE TRIP RUN DELAY IN SECONDS	**5**
Page 4	**SP ALARM**	**SETTINGS FOR ALARM EVENTS**	
1	GFA XXX	GROUND FAULT ALARM LEVEL IN % OF GROUND CT RATIO NUMERATOR	**OFF**
2	I2TA XXX	I2T ALARM LEVEL IN % FULL OF I2T TRIP CAPACITY	**OFF**
3	JMA XXX	JAM ALARM LEVEL IN % FLA	**OFF**
4	JMAR	JAM ALARM RUN DELAY IN SECONDS	**OFF**
5	ULA XXX	UNDERLOAD ALARM LEVEL IN % FLA	**OFF**
6	ULAR XXX	UNDERLOAD ALARM RUN DELAY IN SECONDS	**OFF**
7	UBA XXX	PHASE UNBALANCE ALARM LEVEL	**OFF**
8	UBAR XXX	PHASE UNBALANCE ALARM RUN DELAY IN SECONDS	**10**
Page 5	**SP START**	**SETTINGS FOR START EVENTS**	
1	ST/T XXX	STARTS PER TIME ALLOWED	**1**
2	TS/T XXX	TIME ALLOWED FOR STARTS COUNT IN SECONDS	**OFF**
3	TBS XXX	TIME BETWEEN STARTS IN MINUTES	**OFF**
4	NOCS X	NUMBER OF COLD STRTS ALLOWED	**5**

5	TRNC XXX	MOTOR START TRANSITION CURRENT LEVEL IN % FLA	**50**
6	TRNT XXX	MOTOR START TRANSITION TIME IN SECONDS	**10**
7	Choose transition type	TRN T/C ON TIME AND CUTTENT	**TRN T/C**
8	INSQ XXX	INCOMPLETE SEQUENCE REPORT BACK TIME IN SECONDS ON DISCRETE INPUT 2	**2**
9	INSQ TRN Or INSQ ST	INCOMPLETE SEQUENCE START TIMER EVENT INSQ TRN – START TO RUN TRANSITION	**INSQ TRN**
10	LAT XXX	LONG ACCELERATION TIME IN SECONDS **DO NOT TURN THIS ON. THIS FUNCTION IS CAPABLE OF BLOCKING THERMAL PROTECTION DURIING A START AND DESTROYING THE MOTOR**	**OFF**
11	ZSW ON Or ZSW OFF	ZERO SPEED SWITCH ON DISCREETTE INPUT 1 ON OR OFF	**ZSW OFF**
12	ABK XXXX	ANTI-BACKSPIN DELAY TIME IN SECONDS	**OFF**
Page 6	**SP DI 1**	**SETTING FOR DISCRETE INPUT NUMBER 1**	
1	Choose REM TRIP	CONFIGURE DISCRETE INPUT 1 REM TRIP – REMOTE TRIP	**REM TRIP**
Page 7	**SP DI 2**	**SETTING FOR DISCRETE INPUT NUMBER 2**	
1	Choose INC SEQ	CONFIGURE DISCRETE INPUT 2 INCSEQ- INCOMPLETE SEQUENCE	**INC SEQ**
Page 8	**SP AREL**	**SETTING FOR ALARM RELAY OUTPUT CONFIGURATION**	
1	GF A ON GF T ON Or GF OFF	ENABLE GROUND FAULT ALARM OR TRIP TO ACTIVATE ALARM RELAY OUTPUT OR DISABLE	**GF OFF**
2	I2T A ON I2T T ON or I2T OFF	ENABLE 12T ALARM OR TRIP TO ACTIVATE ALARM RELAY OUTPUT OR DISABLE	**I2T OFF**
3	JAM A ON JAM T ON Or JAM OFF	ENABLE JAM ALARM OR TRIP TO ACTIVATE ALARM RELAY OUTPUT OR DISABLE	**JAM OFF**

4	UL A ON UL T ON Or UL OFF	ENABLE UNDERLOAD ALARM OR TRIP TO ACTIVATE ALARM RELAY OUTPUT OR DISABLE	**UL OFF**
5	B A ON UB T ON Or UB OFF	ENABLE PHASE UNBALANCE ALARM OR TRIP TO ACTIVATE ALARM RELAY OUTPUT OR DISABLE	**UB OFF**
6	WD A ON WD T ON Or WD OFF	ENABLE WINDING TEMP ALARM OR TRIP TO ACTIVATE ALARM RELAY OUTPUT OR DISABLE	**WD OFF**
7	MB A ON MB T ON Or MB OFF	ENABLE MOTOR BEARING ALARM OR TRIP TO ACTIVATE ALARM RELAY OUTPUT OR DISABLE	**MB OFF**
8	LB A ON LB T ON Or LB OFF	ENABLE LOAD BEARING ALARM OR TRIP TO ACTIVATE ALARM RELAY OUTPUT OR DISABLE	**LB OFF**
9	AX A ON AX T ON Or AX OFF	ENABLE AUXILIARY RTD TEMP ALARM OR TRIP TO ACTIVATE ALARM RELAY OUTPUT OR DISABLE	**AX OFF**
10	SX A ON SX T ON Or SX OFF	ENABLE STARTS PER TIME TRIP OR ALARM TO ACTIVATE ALARM RELAY OUTPUT OR DISABLE	**SX OFF**
11	BS T ON Or TBS OFF	ENABLE TIME BETWEEN STARTS TRIP TO ACTIVATE ALARM RELAY OUTPUT OR DISABLE	**TBS OFF**
12	RTDF ON Or RTDF OFF	ENABLE INDIVIDUAL RTD CHANNEL FAILURE TO ACTIVATE ALARM RELAY OUTPUT OR DISABLE	**RTDF OFF**

13	RCOM ON Or RCOM OFF	ENABLE RTD MODULE COMMMUNICA-TION FAILURE TO ACTIVATE ALARM RELAY OUTPUT OR DISABLE	**RCOM OFF**
14	IOCT OFF Or IOCT OFF	ENABLE INSTANTANEOUS TRIP TO ACTIVATE ALARM RELAY OUTPUT OR DISABLE	**IOCT OFF**
15	PH R ON Or PH R OFF	ENABLE PHASE REVERSAL TRIP TO ACTIVATE ALARM RELAY OUTPUT OR DISABLE	**PHR OFF**
16	INSQ ON Or INSQ OFF	ENABLE INCOMPLETE SEQUENCE TRIP TO ACTIVATE ALARM RELAY OUTPUT OR DISABLE	**INSQ OFF**
17	REMT ON Or REMT OFF	ENABLE REMOTE TRIP TO ACTIVATE ALARM RELAY OUTPUT OR DISABLE	**REMT OFF**
18	DIFT ON Or DIFT OFF	ENABLE DIFFERENTIAL TRIP TO ACTI-VATE ALARM RELAY OUTPUT OR DISABLE	**DIFT OFF**
19	INCT ON Or INCT OFF	ENABLE INCOM TRIP TO ACTIVATE ALARM RELAY OUTPUT OR DISABLE	**INCT OFF**
20	TRNT ON Or TRNT OFF	ENABLE TRANSITION TRIP TO ACTIVATE ALARM RELAY OUTPUT OR DISABLE	**TRNT OFF**
21	ZSWT ON Or ZSWT OFF	ENABLE ZERO SPEED SWITCH TRIP TO ACTIVATE ALARM RELAY OUTPUT OR DISABLE	**ZSWT OFF**
22	TBYP ON Or TBYP OFF	ENABLE TRIP BYPASS TO ACTIVATE ALARM RELAY OUTPUT OR DISABLE	**TBYP OFF**
Page 9	**SP AUX1**	**SETTINGS FOR AUX1 RELAY OUTPUT CONFIGURATION**	
1	LSPU XXX	LOAD SHED PICK-UP CURRENT AS % OF FLA	**OFF**
2	LSDO XXX	LOAD SHED DROP-OUT CURRENT AS % OF FLA	**OFF**
3	LSDL XX	LOAD SHED DELAY IN SECONDS	**1**

4	GF A ON GF T ON Or GF OFF	ENABLE GROUND FAULT ALARM OR TRIP TO ACTIVATE AUX1 RELAY OUTPUT OR DISABLE	**GF OFF**
5	I2T A ON I2T T ON Or I2T OFF	ENABLE I2T ALARM OR TRIP TO ACTIVATE AUX1 RELAY OUTPUT OR DISABLE	**I2T T ON**
6	JAM A ON JAM T ON Or JAM OFF	ENABLE JAM ALARM OR TRIP TO ACTIVATE AUX1 RELAY OUTPUT OR DISABLE	**JAM OFF**
7	UL A ON UL T ON Or UL OFF	ENABLE UNDERLOAD ALARM OR TRIP TO ACTIVATE AUX1 RELAY OUTPUT OR DISABLE	**UL OFF**
8	UB A ON UB T ON Or UB OFF	ENABLE PHASE UNBALANCE ALARM OR TRIP TO ACTIVATE AUX1 RELAY OUTPUT OR DISABLE	**UBT ON**
9	WD A ON WD T ON Or WD OFF	ENABLE WINDING TEMP ALARM OR TRIP TO ACTIVATE AUX1 RELAY OUTPUT OR DISABLE	**WD OFF**
10	MB A ON MB T ON Or MB OFF	ENABLE MOTOR BEARING TEMP ALARM OR TRIP TO ACTIVATE AUX1 RELAY OUTPUT OR DISABLE	**MB OFF**
11	LB A ON LB T ON Or LB OFF	ENABLE LOAD BEARING TEMP ALARM OR TRIP TO ACTIVATE AUX1 RELAY OUTPUT OR DISABLE	**LB OFF**
12	AX A ON AX T ON Or AX OFF	ENABLE AUXILIARY RTD TEMP ALARM OR TRIP TO ACTIVATE AUX1 RELAY OUTPUT OR DISABLE	**AX OFF**

13	SX A ON SX T ON Or SX OFF	ENABLE STARTS PER TIME TRIP OR ALARM TO ACTIVATE AUX1 RELAY OUTPUT OR DISABLE	**SX OFF**
14	TBS T ON Or TBS OFF	ENABLE TIME BETWEEN STARTS TRIP TO ACTIVATE AUX1 RELAY OUTPUT OR DISABLE	**TBS OFF**
15	RTDF ON Or RTDF OFF	ENABLE RTD FAILURE DIAGNOSTIC TO ACTIBATE AUX1 RELAY OUTPUT OR DISABLE	**RTDF OFF**
16	RCOM ON Or RCOM OFF	ENABLE RTD MODULE COMMUNICA-TION FAILURE TO ACTIVATE AUX1 RELAY OUTPUT OR DISABLE	**RCOM OFF**
17	IOCT ON Or IOCT OFF	ENABLE INSTANTANEOUS OVERCURRENT TRIP TO ACTIVATE AUX1 RELAY OUTPUT OR DISABLE	**IOCT ON**
18	PH R ON Or PH R OFF	ENABLE PHASE REVERSAL TRIP TO ACTIVATE AUX1 RELAY OUTPUT OR DISABLE	**PR R OFF**
19	INSQ ON Or INSQ OFF	ENABLE INCOMPLETE SEQUENCE TRIP TO ACTIVATE AUX1 RELAY OUTPUT OR DISABLE	**INSQ OFF**
20	REMT ON Or REMT OFF	ENABLE REMOTE TRIP TO ACTIVATE AUX1 RELAY OUTPUT OR DISABLE	**REMT OFF**
21	DIFT ON Or DIFT OFF	ENABLE DIFFERENTIAL TRIP TO ACTI-VATE AUX1 RELAY OUTPUT OR DISABLE	**DIFT OFF**
22	INCT ON Or INCT OFF	ENABLE INCOM TRIP TO ACTIVATE AUX1 RELAY OUTPUT OR DISABLE	**INCT OFF**
23	TRNT ON Or TRNT OFF	ENABLE TRANSITION TRIP TO ACTIVATE AUX1 RELAY OUTPUT OR DISABLE	**TRNT OFF**

24	ZSWT ON Or ZSWT OFF	ENABLE ZERO SPEED SWITCH TRIP TO ACTIVATE AUX1 RELAY OUTPUT OR DISABLE	**ZSWT OFF**
25	TBYP ON Or TBYP OFF	ENABLE TRIP BYPASS TO ACTIVATE AUX1 RELAY OUTPUT OR DISABLE	**TBYP OFF**
Page 10	**SP AUX2**	**SETTINGS FOR AUX2 RELAY OUTPUT CONFIGURATION**	
1	TRN ON Or TRN OFF	ENABLE TRANSITION OUTPUT IF ENABLED ALL OTHER FUNCTIONS FOR AUX 2 ARE DISABLED	**TRN ON**
2	GF A ON GF T ON Or GF OFF	ENABLE GROUND FAULT ALARM OR TRIP TO ACTIVATE AUX2 RELAY OUTPUT OR DISABLE	**GFT ON**
3	12T A ON 12T T ON or 12T OFF	ENABLE 12T ALARM OR TRIP TO ACTI-VATE AUX2 RELAY OUTPUT OR DISABLE	**12T OFF**
4	JAM A ON JAM T ON Or JAM OFF	ENABLE JAM ALARM OR TRIP TO ACTIVATE AUX2 RELAY OUTPUT OR DISABLE	**JAM OFF**
5	UL A ON UL T ON Or UL OFF	ENABLE UNDERLOAD ALARM OR TRIP TO ACTIVATE AUX2 RELAY OUTPUT OR DISABLE	**UL OFF**
6	UB A ON UB T ON Or UB OFF	ENABLE PHASE UNBALANCE ALARM OR TRIP TO ACTIVATE AUX2 RELAY OUTPUT OR DISABLE	**UB OFF**
7	WD A ON WD T ON Or WD OFF	ENABLE WINDING TEMP ALARM OR TRIP TO ACTIVATE AUX2 RELAY OUTPUT OR DISABLE	**WD OFF**

8	MB A ON MB T ON Or MB OFF	ENABLE MOTOR BEARING TEMP ALARM OR TRIP TO ACTIVATE AUS2 RELAY OUTPUT OR DISABLE	**MB OFF**
9	LB A ON LB T ON Or LB OFF	ENABLE LOAD BEARING TEMP ALARM OR TRIP TO ACTIVATE AUX2 RELAY OUTPUT OR DISABLE	**LB OFF**
10	AX A ON AX T ON Or AX OFF	ENABLE AUXILIARY RTD TEMP ALARM OR TRIP TO ACTIVATE AUX2 RELAY OUTPUT OR DISABLE	**AX OFF**
11	SX A ON SX T ON Or SX OFF	ENABLE STARTS PER TIME TRIP OR ALARM TO ACTIVATE AUX2 RELAY OUTPUT OR DISABLE	**SX OFF**
12	TBS T ON Or TBS OFF	ENABLE TIME BETWEEN STARTS TRIP OR TO ACTIVATE AUX2 RELAY OUTPUT OR DISABLE	**TBS OFF**
13	RTDF ON Or RTDF OFF	ENABLE RTD FAILURE DIAGNOSTIC TO ACTIVATE AUX2 RELAY OUTPUT OR DISABLE	**RTDF OFF**
14	RCOM ON Or RCOM OFF	ENABLE RTD MODULE COMMUNICA-TION FAILUR TO ACTIVATE AUX2 RELAY OUTPUT OR DISABLE	**RCOM OFF**
15	IOC A ON IOC T ON Or IOC OFF	ENABLE INSTANTANEOUS OVERCURRENT ALARM OR TRIP TO ACTIVATE AUX2 RELAY OUTPUT OR DISABLE	**IOCT OFF**
16	PH R ON Or PH R OFF	ENABLE PHASE REVERSAL TRIP TO ACTIVATE AUX2 RELAY OUTPUT OR DISABLE	**PH R OFF**
17	INSQ ON Or INSQ OFF	ENABLE INCOMPLETE SEQUENCE TRIP TO ACTIVATE AUX2 RELAY OUTPUT OR DISABLE	**INSQ OFF**

18	REMT ON Or REMT OFF	ENABLE REMOTE TRIP TO ACTIVATE AUX2 RELAY OUTPUT OR DISABLE	**REMT OFF**
19	DIFT ON Or DIFT OFF	ENABLE DIFFERENTIAL TRIP TO ACTI-VATE AUX2 RELAY OUTPUT OR DISABLE	**DIFT OFF**
20	INCT ON Or INCT OFF	ENABLE INCOM TRIP TO ACTIVATE AUX2 RELAY OUTPUT OR DISABLE	**INCT OFF**
21	TRNT ON Or TRNT OFF	ENABLE TRANSITION TRIP TO ACTIVATE AUX2 RELAY OUTPUT OR DISABLE	**TRNT OFF**
22	ZSWT ON Or ZSWT OFF	ENABLE ZERO SPEED SWTICH TRIP TO ACTIVATE AUX2 RELAY OUTPUT OR DISABLE	**ZSWT OFF**
23	TBYP ON Or TBYP OFF	ENABLE TRIP BYPASS TO ACTIVATE AUX2 RELAY OUTPUT OR DISABLE	**TBYP OFF**
Page 11	**SP A OUT**	**SETTING FOR ANALOG OUTPUT CONFIGURATION**	
1	MAX 100 MAX 125 MAX WRTD MAX %12T	4-20 MA OUTPUT MAX 100 – 20 MA FOR 100% FLA MAX 125 – 20 MA FOR 125% FLA MAX WRTD – 20 MA FOR TRIP LEVEL MAX %12T – 20 MA FOR 100% 12T	**MAX 125**
Page 12	**SP SYS**	**SETTING FOR SYSTEM CONFIGURATION**	
1	TP MODE X	CONFIGURE TRIP RELAY OUTPUT TO BE MODE 1 – TRIP RELAY ENERGIZES ON TRIP EVENT OR MODE 2 – TRIP RELAY ENERGIZES ON POWER UP AND DE-ENGERIZES ON TRIP EVENT	**MAX 125**
2	AL MODE X	CONFIGURE ALARM RELAY OUTPUT TO BE MODE 1 – ALARM RELAY ENERGIZES ON ALARM EVENT OR MODE 2 – ALARM RELAY ENERGIZES ON POWER UP AND DE-ENERGIZES ON ALARM EVENT	**TP MODE 2**
3	AX1 MOD X	CONFIGURE AUX1 RELAY OUTPUT TO BE MODE 1 – AUX 1 RELAY ENERGIZES ON AUX1 EVEN OR MODE 2 – AUX1 RELAY ENERGIZES ON POWER UP AND DE-ENERGIZES ON AUX1 EVENT	**AX1 MODE 2**

4	AX2 MOD X	CONFIGURE AUX2 RELAY OUTPUT TO BE MODE 1 – AUX2 RELAY ENERGIZES ON AUX2 EVENT OR MODE 2 – AUX2 RELAY ENERGIZES ON POWER UP AND DE-ENERGIZES ON AUX2 EVENT	**AX2 MODE 1**
5	MAN 12T Or AUTO 12T	AUTO OR MANUAL 12T RESET	**MAN 12T**
6	RUN PGM Or STOP PGM	ENABLES UNIT TO BE PROGRAMMED WHILE MOTOR IS RUNNING	**STOP PGM**
8	12 HOUR or 24 HOUR	SET REAL TIME CLOCK DISPLAY 12 HOUR – AM/PM TIME DISPLAYED 13 24 HOUR – 24 HOUR TIME DISPLAYED	**12 HOUR**
9	MONTH XX	SET REAL TIME CLOCK MONTH	
10	DAY XX	SET REAL TIME CLOCK DAY	
11	YEAR XX	SET REAL TIME CLOCK YEAR	
12	HOUR XX	SET REAL TIME CLOCK HOUR	
13	MIN XX	SET REAL TIME CLOCK MINUTE	
14	M D Y Or D M Y	SET REAL TIME DATE DISPLAY MONTH DAY YEAR OR DAY MONTH YEAR	
15	IQ2 EN Or IQ2 DIS	EMPACC COMMUNICATION MODE IQ2 EN – IQ1000II EMULATION IQ2 DIS – MP-3000 COMMUNICATION	**I2T EN**
16	RLYF TRP RLYF ALM Or RLYF T+A	INTERNAL DIAGNOSTIC FAILURE ACTIVATES TRIP AND OR ALARM RELAY	**RLYF T+A**
17	INCT DIS Or INCT EN	INCOM TRIP DISABLED OR ENABLED	**INCT DIS**
18	DISARMED Or ARMED	ARM OR DISARM TRIP RELAY WARNING DISARM WILL NOT ALLOW TRIP RELAY TO FUNCTION TRIP WARNING MP-3000 WILL BE DISARMED UPON EXIT OF PROGRAM MODE AND WILL NOT PROTECT THE MOTOR-ENTER ARMED INTO SETTING TO PROTECT THE MOTOR	**ARMED**

Page 13	SP TEST	SETTINGS FOR TESTING INPUTS AND OUTPUTS	
1	3 PHASE or 1 PHASE	SINGLE PHASE TEST MODE OR THREE PHASE PROTECTION MODE	**3-PHASE**