ASA SYSTEM
SPECIFICATION

NORCHEM

Model CS 3000-IL

COOKED STARCH/ASA
IN-LINE CONTINUOUS EMULSIFIER

NORCHEM INDUSTRIES Model CS 3000-IL ASA emulsification unit is designed to meter and emulsify ASA (alkenyl succinic anhydride) and cooked starch at emulsion flow rates up to 20 gpm (1200 GPH) @ 1-5% concentration and up to 48 GPH (3000 ml/min) of neat ASA and Starch. The CS 3000-IL is modular in design consisting of a stainless steel emulsifier manifold block, neat ASA metering module, variable speed stainless steel turbine pump, primary and secondary magnetic meters, ASA mass flow meter, Panelview 600 color interface screen, control panel and SS base frame.

MODEL CS 3000-IL SYSTEM SPECIFICATIONS:

FRAME:	**BASE:**	**48" W X 60" L X 64" H**
	CONSTRUCTION:	**304 SS Welded Frame**
PANEL:	**ENCLOSURE:**	**NEMA 4X**
TURBINE MODULE:	**PUMP:**	**STAINLESS STEEL, 300 PSI OPERATING PRESSURE**
	DRIVE:	**10 HP AC FREQUENCY**
	MOTOR:	**460/3/60, 10 HP, 12.5 AMP, 0-4800 RPM, TENV, WASHDOWN DUTY**
	SEAL:	**PROPRIETARY FLOW THRU ENCAPSULATED CARBIDE/GRAPHITE**
FLOWMETERS:	**STARCH:**	**PRIMARY/SECONDARY E&H MAGNETIC FLOWMETERS**
	ASA:	**E&H MASS FLOWMETER**
ASA:	**PUMP:**	**ROTARY GEAR, STAINLESS STEEL, CHEMICAL SERVICE**
	DRIVE:	**AC TECH FREQUENCY DRIVE**
	MOTOR:	**460/3/60, 0.5 HP, 1.2 AMP, 0-1000 RPM, TEFC, WASHDOWN DUTY**
	CAPACITY:	**0-3000 ML/MIN @ 80 PSI**
EMULSION OUTPUT:	**PRIMARY FLOW:**	**0.25 – 2.0 GPM (15-120 GPH)**
	SECONDARY FLOW:	**1 – 20 GPM (60-1200 GPH)**
CONCENTRATION:	**SOLUTION:**	**PRIMARY: 5 - 50%, VOLUME ON VOLUME**
		SECONDARY: 0.2 TO 5.0%, VOLUME ON VOLUME
CONTROLS:	**PLC:**	**ALLEN-BRADLEY SLC 503 WITH DH+**
	SCREEN:	**ALLEN BRADLEY 600 COLOR PANELVIEW**
	ASA:	**RATIO CONTROLLED FUNCTION**
	STARCH:	**CASHCO CONTROL VALVES, PRIMARY/SECONDARY**
UTILITIES:	**ELECTRICAL:**	**460 VAC, 3 PHASE, 60 HERTZ, 30 AMP**
	STARCH:	**20 GPM @ 80 PSI, Filtered to 100 mesh SOURCE**

ENGINEERING SPECIFICATIONS:

The NORCHEM Model CS 3000-IL ASA emulsification unit is designed to meter and emulsify ASA and an emulsifier to create a stable emulsion with proper particle size and distribution for good sizing reactivity. The Model CS 3000-IL features a dual element starch pre-conditioning injection system and internal auto flow functions to preserve emulsion formation and performance. The emulsifier system consists of a variable speed single stage frame mounted stainless turbine with a stainless manifold emulsifier block, AC variable speed ASA injection pump with analog following capabilities, Inlet starch motorized valve with PRV, ratio control loops for ASA, starch, Allen-Bradley PLC for DCS integration, primary and secondary starch flow dilution headers. Additional instrumentation includes low starch and ASA flow alarms, temperature and pressure. Optional instrumentation available; Norchem's EQM **E**mulsion **Q**uality **M**onitor real time laser monitor.

NORCHEM INC.

RIDGEPOINT TECH CENTER 8910 W. 192ND STREET MOKENA. IL 60448 708 478-4777

INCOMING POWER

460 VAC/3 PH/60 HZ

L1 L2 L3 G

MAIN DISCONNECT
60 AMP

L1 L2 L3

GROUND

PDB

1L1 1
1L2 3
1L3 5

PSLM
PHASE SEQUENCE
AND LOSS MONITOR
1
8
1
101

TO PLC INPUT
I:1.0/1

CB1–25.0
5SX2325–8

RCT1
KLR16ATB

R1L1 L1
R1L2 L2
R1L3 L3

ACD1
10 HP
SF4100

T1 1T1
T2 1T2
T3 1T3
GND GND

M1

GROUND

TURBINE DRIVE MOTOR
10.0 HP @ 460 VAC 14.0 FLA
CLASS F INSULATION 1.15 SF
RELIANCE ELECTRIC P21G4901

1	2	5	6	11	12	2	14	13A	13B	13C	15	25	2	30	31	TXA	TXB

D11A D15A

PLC–BSC–12DC–21/
REL–MR–12DC/21AU

D1A R1 D2A
[4] [3]
TURBINE DRIVE
RUN RELAY

DR1
[A+] [A–]

SHLD
404+
404–

TURBINE DRIVE FREQUENCY
0–10 VDC INPUT TO O:4.0/4
0 VDC = 0.0 HZ
10 VDC = 85.0 HZ%

SHLD
600–
600+

TURBINE DRIVE SPEED REFERENCE
4–20 mA OUTPUT FROM O:4.0/4
4 mA = 0.0 %
20 mA = 100.0 %

CB2–10.0
5SX2310–8

RCT2
KLR2ATB

2L1 R2L1 L1
2L2 R2L2 L2
2L3 R2L3 L3

ACD2
1 HP
SF410

T1 2T1
T2 2T2
T3 2T3
GND GND

M2

GROUND

LIQUID STARCH PUMP MOTOR
3/4 HP @ 460 VAC 1.4 FLA
CLASS F INSULATION 1.15 SF
RELIANCE ELECTRIC P56X4516

1	2	5	6	11	12	2	14	13A	13B	13C	15	25	2	30	31	TXA	TXB

D11B D15B

PLC–BSC–12DC–21/
REL–MR–12DC/21AU

D1B R2 D2B
[4] [3]
STARCH DRIVE
RUN RELAY

DR2
[A+] [A–]

SHLD
405+
405–

LIQUID STARCH DRIVE FREQUENCY
0–10 VDC INPUT TO O:4.0/5
0 VDC = 0.0 HZ
10 VDC = 60.0 HZ

SHLD
601–
601+

LIQUID STARCH DRIVE SPEED REFERENCE
4–20 mA OUTPUT FROM O:4.0/5
4 mA = 0.0 %
20 mA = 100.0 %

CB3–10.0
5SX2310–8

RCT3
KLR2ATB

L1 3L1 R3L1 L1
L2 3L2 R3L2 L2
L3 3L3 R3L3 L3

ACD3
1 HP
SF410

T1 3T1
T2 3T2
T3 3T3
GND GND

M3

GROUND

ASA PUMP MOTOR
3/4 HP @ 460 VAC 1.4 FLA
CLASS F INSULATION 1.15 SF
RELIANCE ELECTRIC P56X4516

1	2	5	6	11	12	2	14	13A	13B	13C	15	25	2	30	31	TXA	TXB

D11C D15C

PLC–BSC–12DC–21/
REL–MR–12DC/21AU

D1C R3 D2C
[4] [3]
ASA DRIVE
RUN RELAY

DR3
[A+] [A–]

SHLD
406+
406–

ASA DRIVE FREQUENCY
0–10 VDC INPUT TO O:4.0/6
0 VDC = 0.0 HZ
10 VDC = 60.0 HZ%

SHLD
602–
602+

ASA DRIVE SPEED REFERENCE
4–20 mA OUTPUT FROM O:4.0/6
4 mA = 0.0 %
20 mA = 100.0 %

L1 L2 L3

MODEL: A*–3000/CS–3000IL
CUSTOMER: xxxxx
CUSTOMER P.O. NO.: xxxxx
NCI PROJECT: TYPICAL
SCHEMATIC NO.: NCI–091703–1A REV. A
SHEET 1 OF 7

1 L2 L3

CB4–6.0
5SX2306–8

RCT4
KLR6ATB

L1 4L1 C1 C2 R4L1 L1
L2 4L2 B1 B2 R4L2 L2
L3 4L3 A1 A2 R4L3 L3

ACD4
3 HP
SF430

T1 4T1
T2 4T2
T3 4T3
GND GND

M4

GROUND

DILUTION WATER BOOSTER PUMP MOTOR
3 HP @ 460 VAC 3.6 FLA
CLASS B INSULATION 1.0 SF
FRANKLIN ELECTRIC 1313017118

1 2 5 6 11 12 2 14 13A 13B 13C 15 25 2 30 31 TXA TXB

D11D D15D

D1D R4 D2D
[4] [3]
BOOSTER PUMP
DRIVE RUN RELAY

PLC–BSC–12DC–21/
REL–MR–12DC/21AU
R4
[A+] [A–]

SHLD
603–
603+

BOOSTER PUMP DRIVE SPEED REFERENCE
4–20 mA OUTPUT FROM 0:6.0/3
4 mA = 0.0 %
20 mA = 100.0 %

CB5–3.0
5SX2203–8

L2 4L2
L1 4L1

CONTROL TRANSFORMER 500 VA
460 VAC PRIMARY/120 VAC SECONDARY

X1 X1A X2A

CB6–6.0
5SX2106–7

X1

L N G
ICS
L N G

GROUND

SURGE PROTECTION
DEVICE

1 X2

CB7–1.0
5SX2101–7

2

COMPUTER POWER
INTERFACE TERMINAL

G

"POWER ON"
INDICATOR

PANELVIEW TERMINAL
LOCATED ON ENCLOSURE DOOR

PV600

GRD

PANELVIEW
INTERFACE TERMINAL

RS–232/DH–485 LINK

PLC 5/03
SLOT 0

PROGRAMMABLE
CONTROLLER

L N
1746–P4
24– 24+
G

24– 24+

GRD

PLC POWER
SUPPLY

USER 24 VDC
LOCATED AT PLC

1 X2

MODEL: A*–3000/CS–3000IL
CUSTOMER: xxxxx
CUSTOMER P.O. NO.: xxxxx
NCI PROJECT: TYPICAL
SCHEMATIC NO.: NCI–091703–1A REV. A
SHEET 2 OF 7

1

X2

PIN 2

RED

PV

+6

COMMON

GREEN

WHITE

BLACK

POWER SUPPLY

SIGNAL CONDITIONER

[+6]

COM

[−6]

PS

PIN 3

PIN 1

PIN 4

EP1

+

−

EMULSION QUALITY
SENSOR ELECTRONICS

SHLD

403+

403−

EMULSION QUALITY MONITOR
4−20 VDC INPUT TO 0:4.0/2
4 mA = 6.00
20 mA = 0.00

LOCATED ON SKID

L

N

G

FIT−101

+

−

GRD

SHLD

400+

400−

PRIMARY WATER FLOW
4−20 mA INPUT TO I:4.0/0
4 mA = 0.0 GPM
20 mA = 3.0 GPM

LOCATED ON SKID

FIT−102

SHLD

401+

401−

SECONDARY WATER FLOW
4−20 mA INPUT TO I:4.0/1
4 mA = 0.0 GPM
20 mA = 36.0 GPM

DILUTION WATER VALVE
LOCATED ON SKID

R1

3

[6]

[5]

INSTRUMENT AIR VALVE
LOCATED ON SKID

R6

4

[3]

[4]

1

X2

MODEL: A*−3000/CS−3000IL
CUSTOMER: xxxxx
CUSTOMER P.O. NO.: xxxxx
NCI PROJECT: TYPICAL
SCHEMATIC NO.: NCI−091703−1A REV. A
SHEET 3 OF 7

1

X2

1746–IA16
SLOT 1

JP1	100	IN 0	I:1.0/0	PERMISSIVE CONTACT
PSLM [8] [9]	101	IN 1	I:1.0/1	PHASE LOSS AND SEQUENCE MONITOR
EMERGENCY STOP	102	IN 2	I:1.0/2	EMERGENCY STOP PUSHBUTTON
DR1 [11] [14]	103	IN 3	I:1.0/3	AC DRIVE 1 (TURBINE) DRIVE STATUS
DR2 [11] [14]	104	IN 4	I:1.0/4	AC DRIVE 2 (STARCH) DRIVE STATUS
DR3 [11] [14]	105	IN 5	I:1.0/5	AC DRIVE 3 (ASA) DRIVE STATUS
DR6 [11] [14]	106	IN 6	I:1.0/6	AC DRIVE 4 (BOOSTER) DRIVE STATUS
	107	IN 7	I:1.0/7	SPARE
	108	IN 8	I:1.0/8	SPARE
	109	IN 9	I:1.0/9	SPARE
	110	IN 10	I:1.0/10	SPARE
	111	IN 11	I:1.0/11	SPARE
	112	IN 12	I:1.0/12	SPARE
	113	IN 13	I:1.0/13	SPARE
	114	IN 14	I:1.0/14	SPARE
	115	IN 15	I:1.0/15	SPARE

AC COM

5

R

X2

1

2

MODEL: A*–3000/CS–3000IL
CUSTOMER: xxxxx
CUSTOMER P.O. NO.: xxxxx
NCI PROJECT: TYPICAL
SCHEMATIC NO.: NCI–091703–1A REV. A
SHEET 4 OF 7

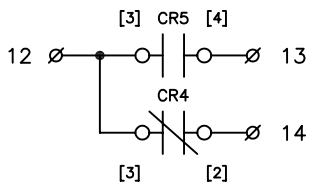
2

X2

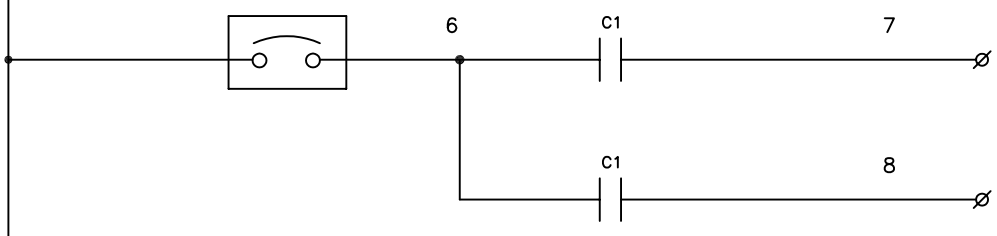
1746–OX8
SLOT 2

				C1	[8] [1]	ALUM/CITRUS INJECTION PUMPS START CONTACTOR
VAC 0	0:2.0/0	OUT 0	200	R1	[8] [1]	AC DRIVE 1 (TURBINE) START RELAY
VAC 1	0:2.0/1	OUT 1	201	R2	[5] [1]	AC DRIVE 2 (STARCH) START RELAY
VAC 2	0:2.0/2	OUT 2	202	R3	[5] [1]	AC DRIVE 3 (ASA) START RELAY
VAC 3	0:2.0/3	OUT 3	203	R4	[5] [1]	AC DRIVE 4 (BOOSTER) START RELAY
VAC 4	0:2.0/4	OUT 4	204	R5	[5] [1]	COMMON ALARM/ FAULT SUMMARY
205 VAC 5	0:2.0/5	OUT 5	205A			DCS NON–CRITICAL ALARM SUMMARY
206 VAC 6	0:2.0/6	OUT 6	206A			DCS SYSTEM RUNNING
VAC 7	0:2.0/7	OUT 7	207A	R6	[5] [1]	INSTRUMENT AIR SOLENOID VALVE (EQM)

DCS OUPUT
ALARM SUMMARY



CB8–2.0
5SX2102–7



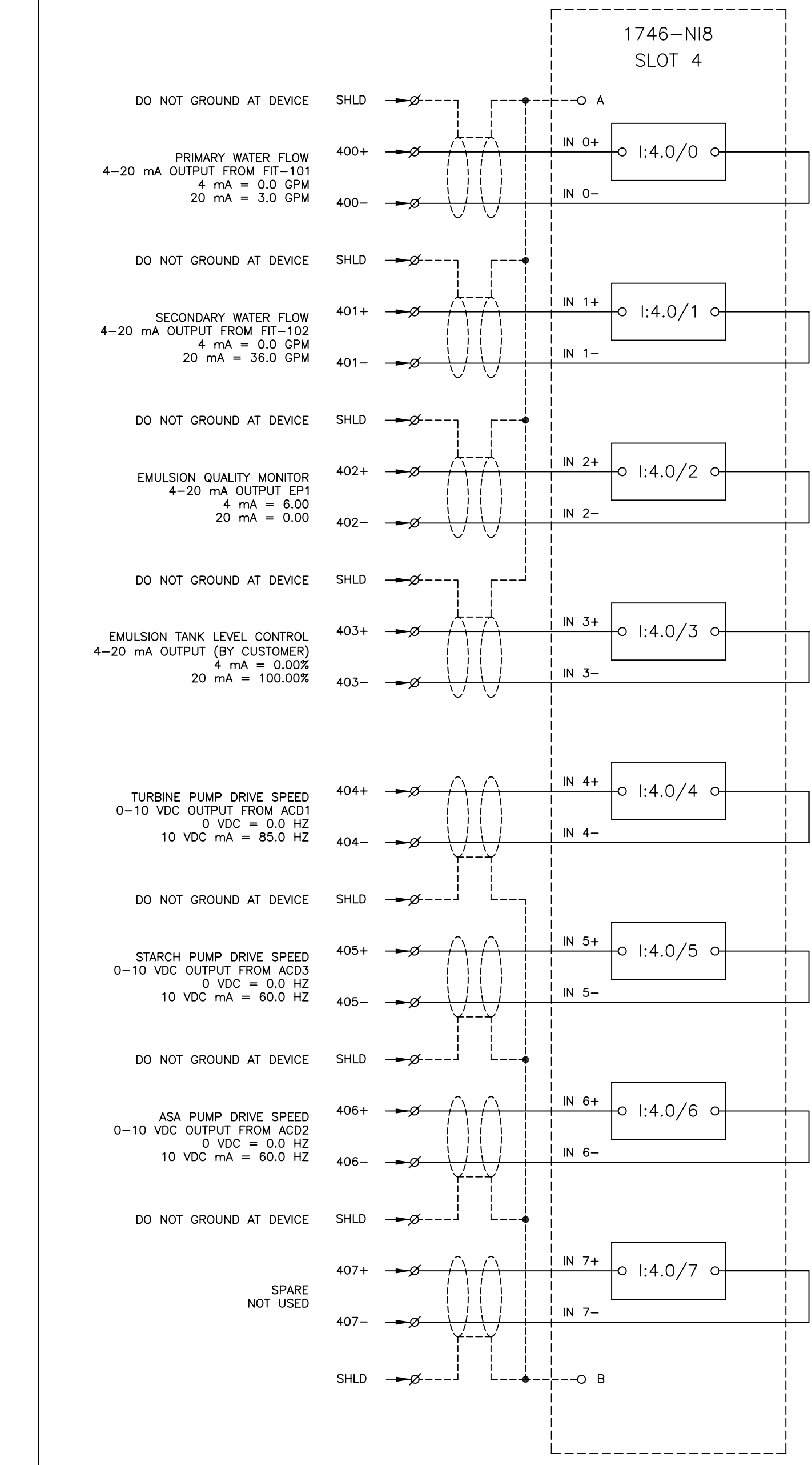
TO FIELD RECEPTACLE
ALUM METERING PUMP

TO FIELD RECEPTACLE
CITRUS METERING PUMP

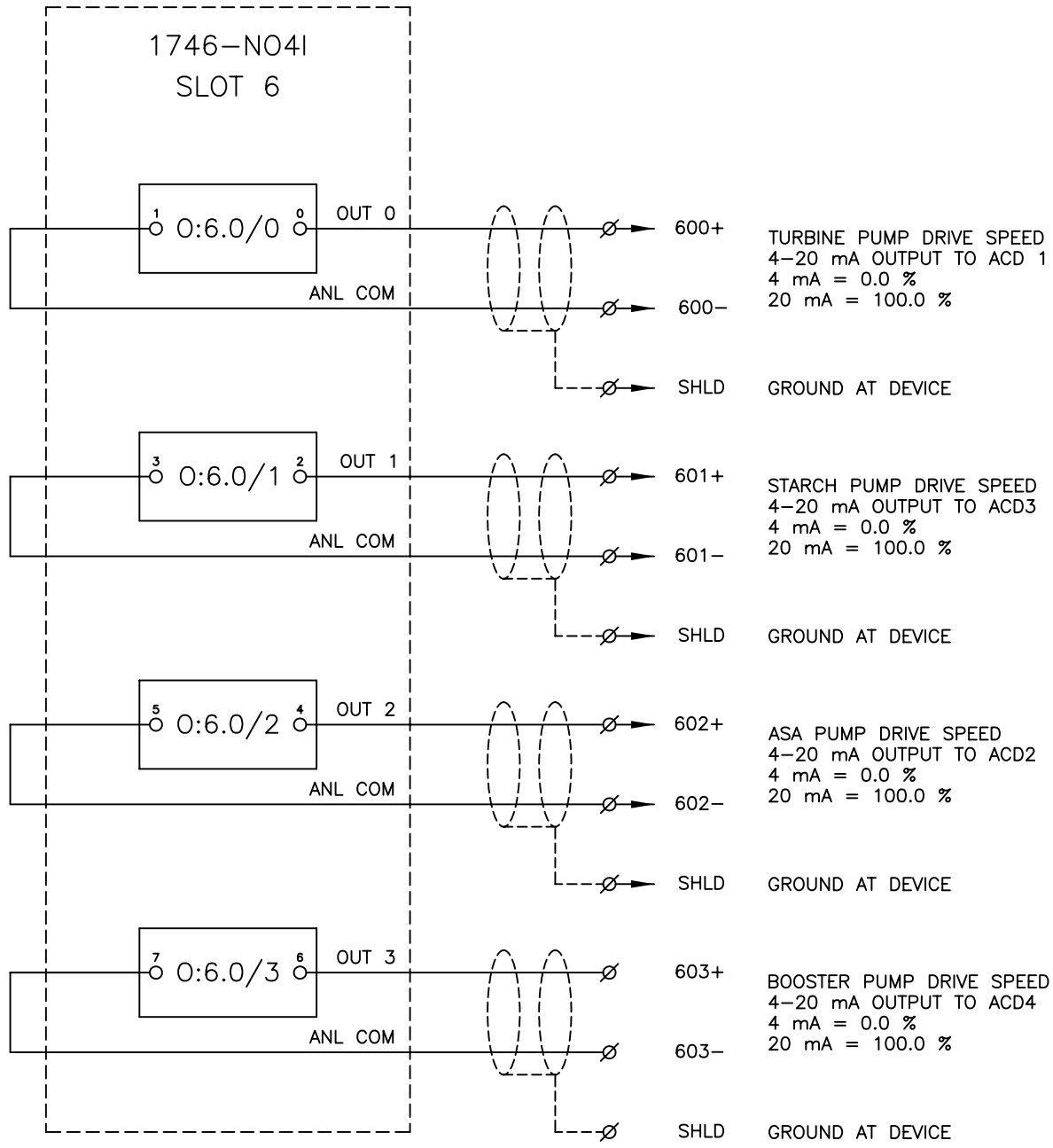
2

X2

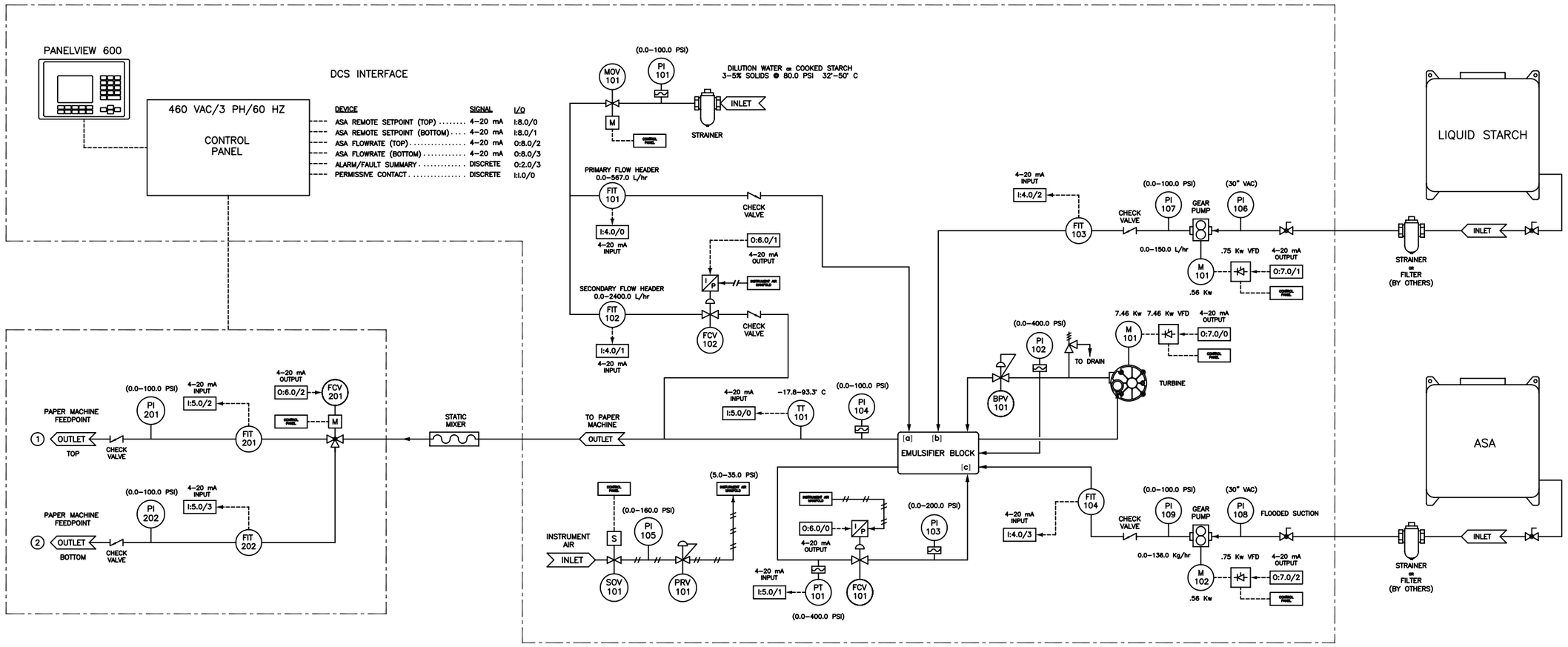
MODEL: A*–3000/CS–3000IL
CUSTOMER: xxxxx
CUSTOMER P.O. NO.: xxxxx
NCI PROJECT: TYPICAL
SCHEMATIC NO.: NCI–091703–1A REV. A
SHEET 5 OF 7



MODEL: A*–3000/CS–3000IL
CUSTOMER: xxxxx
CUSTOMER P.O. NO.: xxxxx
NCI PROJECT: TYPICAL
SCHEMATIC NO.: NCI–091703–1A REV. A
SHEET 6 OF 7



MODEL: A*–3000/CS–3000IL
CUSTOMER: xxxxx
CUSTOMER P.O. NO.: xxxxx
NCI PROJECT: TYPICAL
SCHEMATIC NO.: NCI–091703–1A REV. A
SHEET 7 OF 7



PIPING AND INSTRUMENTATION DIAGRAM

A*3000/CS–3000–IL EMULSIFICATION SYSTEM (100)

DEVICES

PI–101 WATER/COOKED STARCH INLET PRESSURE GAUGE
PI–102 TURBINE PUMP DISCHARGE PRESSURE GAUGE
PI–103 PRIMARY WATER/COOKED STARCH PRESSURE GAUGE
PI–104 EMULSION DISCHARGE PRESSURE GAUGE
PI–105 INSTRUMENT AIR INLET PRESSURE GAUGE
PI–106 LIQUID STARCH PUMP INLET SUCTION GAUGE
PI–107 LIQUID STARCH PUMP DISCHARGE GAUGE
PI–108 ASA PUMP INLET SUCTION GAUGE
PI–109 ASA PUMP DISCHARGE GAUGE

M–101 TUBINE PUMP MOTOR
M–102 LIQUID STARCH PUMP MOTOR
M–103 ASA PUMP MOTOR

MOV–1 INLET WATER/COOKED STARCH MOTORIZED VALVE

SOV–1 INSTRUMENT AIR SOLENOID VALVE

FIT–101 PRIMARY WATER/COOKED STARCH FLOW INDICATING TRANSMITTER
FIT–102 SECONDARY WATER/COOKED STARCH FLOW INDICATING TRANSMITTER
FIT–103 LIQUID STARCH FLOW INDICATING TRANSMITTER
FIT–104 ASA FLOW INDICATING TRANSMITTER

FCV–101 PRIMARY WATER/COOKED STARCH FLOW CONTROL VALVE
FCV–102 SECONDARY WATER/COOKED STARCH FLOW CONTROL VALVE

BPV–101 TURBINE BACK PRESSURE REGULATOR VALVE
PRV–101 INSTRUMENT AIR PRESSURE REGUATOR VALVE

TT–101 EMULSION TEMPERATURE TRANSMITTER
PT–101 TURBINE PRESSURE TRANSMITTER

DISCRETE INPUTS

I:1.0/0 DCS PERMISSIVE CONTACT (RELAY INPUT)

DISCRETE OUTPUTS

O:2.0/3 DCS FAULT/ALARM SUMMARY (RELAY OUTPUT)

ANALOG INPUTS

I:4.0/0 PRIMARY WATER/COOKED STARCH FLOW 4–20 mA SIGNAL (FIT–101)
I:4.0/1 SECONDARY WATER/COOKED STARCH FLOW 4–20 mA SIGNAL (FIT–102)
I:4.0/2 LIQUID STARCH FLOW 4–20 mA SIGNAL (FIT–103)
I:4.0/3 ASA FLOW 4–20 mA SIGNAL (FIT–104)

I:4.0/4 EMULSION TEMPERATURE 4–20 mA SIGNAL (TT–101)
I:4.0/5 TURBINE PRESSURE 4–20 mA SIGNAL (PT–101)

ANALOG OUTPUTS

O:6.0/0 PRIMARY WATER/COOKED STARCH FLOW CONTROL VALVE 4–20 mA SIGNAL (FCV–101)
O:6.0/1 SECONDARY WATER/COOKED STARCH FLOW CONTROL VALVE 4–20 mA SIGNAL (FCV–102)

O:7.0/0 TUBINE PUMP AC FREQUENCY DRIVE 4–20 mA SIGNAL (ACD1)
O:7.0/1 LIQUID STARCH PUMP AC FREQUENCY DRIVE 4–20 mA SIGNAL (ACD2)
O:7.0/2 ASA PUMP AC FREQUENCY DRIVE 4–20 mA SIGNAL (ACD3)

FEEDPOINT DISTRIBUTION SKID (200)

DEVICES

PI–201 FEEDPOINT DISTRIBUTION PRESSURE GAUGE (TOP)
PI–202 FEEDPOINT DISTRIBUTION PRESSURE GAUGE (BOTTOM)

FCV–201 FEEDPOINT DISTRIBUTION 3–WAY MOTORIZED CONTROL VALVE

FIT–201 FEEDPOINT DISTRIBUTION FLOW INDICATING TRANSMITTER (TOP)
FIT–202 FEEDPOINT DISTRIBUTION FLOW INDICATING TRANSMITTER (BOTTOM)

ANALOG INPUTS

I:4.0/6 FEEDPOINT DISTRIBUTION FLOW (TOP) 4–20 mA SIGNAL (FIT–201)
I:4.0/7 FEEDPOINT DISTRIBUTION FLOW (BOTTOM) 4–20 mA SIGNAL (FIT–202)

ANALOG OUTPUTS

O:6.0/2 EMULSION DOSING 3–WAY FLOW CONTROL VALVE 4–20 mA SIGNAL (FCV–201)

I:8.0/0 DCS ASA CHEMICAL SETPOINT (TOP) 4–20 mA SIGNAL
I:8.0/1 DCS ASA CHEMICAL SETPOINT (BOTTOM) 4–20 mA SIGNAL
O:8.0/2 DCS ASA CHEMICAL FLOWRATE (TOP) 4–20 mA SIGNAL (FIT–201)
O:8.0/3 DCS ASA CHEMICAL FLOWRATE (BOTTOM) 4–20 mA SIGNAL (FIT–202)

CONNECTION TO PROCESS
PNEUMATIC SIGNAL LINE
ELECTRICAL SIGNAL
SKID OUTLINE

NORCHEM INC.
8910 W. 192nd STREET
MOKENA, ILLINOIS 60448

SYM.	REVISIONS	DATE
A	FOR INFORMATION ONLY	01–30–03

CUSTOMER: NORCHEM INC., MOKENA, IL 60448

DWN.	RWD
CHK'D	RWD
APP'D	RWD
CADFILE	A_3000_PID_SPEC
SHT.	1 OF 1
SCALE	NONE

DESCRIPTION: NORCHEM A*3000/CS–3000–IL ASA EMULSIFIER PIPING & INSTRUMENT DIAGRAM

CONTRACT NUMBER: –

PROJECT NUMBER: TYPICAL

DRAWING NUMBER: NCI–0505000–1

REV: A