SEPARTED I/O ROUTINE

JSR	
Routine Name	IO

0

MODE SELECTION
ROUTINE

JSR	
Routine Name	MODE_SELECTION

1

PROCESS LOGIC

JSR	
Routine Name	CTRL

2

ALARMS AND
NOTIFICATIONS

JSR	
Routine Name	ALARMS_NOTIFICATION

3

(End)

ASSIGNS PHYSICAL PUSH-BUTTONS TO LOGICAL TAGS

0

IN_START_PB
<Local:1:I.Data.0>

START_PB

HMI_START

1

IN_STOP_PB
<Local:1:I.Data.1>

STOP_PB

HMI_STOP

2

IN_AUTO_PB
<Local:1:I.Data.2>

AUTO_PB

HMI_AUTO

3

IN_MANUAL_PB
<Local:1:I.Data.3>

MANUAL_PB

HMI_MANUAL

ASSIGNS LOGICAL TAGS TO OUTPUT (CONTROL) SIGNALS

4

FAULT_LT

OUT_FAULT_LT
<Local:2:O.Data.0>

5

PUMP

OUT_PUMP
<Local:2:O.Data.1>

6

VFD

OUT_VFD
<Local:2:O.Data.4>

SCALE TANK TO 0-100% FROM ANALOG SIGNAL OF 4-20mA, ALSO HANDLES EDGE-CASES

7

MOV	
Source	Local:3:I.Ch0Data
	0.0
Dest	RAW_TANK_LEVEL
	0.0

8

CPT	
Dest	TANK_LEVEL
	0.0
Expression	((RAW_TANK_LEVEL-6554)*100)/26213

LES			MOV	
Source A	TANK_LEVEL		Source	0
	0.0			
Source B	0		Dest	TANK_LEVEL
				0.0

GRT			MOV	
Source A	TANK_LEVEL		Source	100
	0.0			
Source B	32267		Dest	TANK_LEVEL
				0.0

SCALE FLOW RATE TO 0-500 LMP FROM ANALOG INPUT SIGNAL OF 4-20mA

9

```
                                                    MOV
                                                    Source    Local:3:I.Ch1Data
                                                                           0.0
                                                    Dest   RAW_FLOW_LEVEL
                                                                           0.0
```

10

```
                              CPT
                              Dest                          FLOW_LEVEL
                                                                     0.0
                              Expression  ((RAW_FLOW_LEVEL-6554)*500)/26213


        LES                                    MOV
        Source A   FLOW_LEVEL                   Source              0
                          0.0
        Source B           0                   Dest   FLOW_LEVEL
                                                                   0.0


        GRT                                    MOV
        Source A   FLOW_LEVEL                   Source            500
                          0.0
        Source B        32267                  Dest   FLOW_LEVEL
                                                                   0.0
```

CONVERTS SPEED % TO 4-20mA EQUIVALENT ANALOG OUTPUT

11

```
                                           CPT
                                           Dest              RAW_VFD_SPEED
                                                                         0.0
                                           Expression  (VFD_SPEED*26213/100)+6554.0
```

12

```
                                                    MOV
                                                    Source   RAW_VFD_SPEED
                                                                          0.0
                                                    Dest        Local:4:O.Ch0Data
                                                                          0.0
```

(End)

SYS_START PULSE ON START_PB

```
0    START_PB   ONS_START                                                    SYS_START
       ] [        ] [                                                           ( )
                  ONS
     SYS_START   STOP_PB
       ] [        ]/[
```

SETS MANUAL MODE

```
1    MANUAL_PB   SYS_START   AUTO_MODE                                       MANUAL_MODE
       ] [         ] [          ]/[                                             ( )
                                                                            LT_MANUAL_MODE
     MANUAL_MODE  STOP_PB                                                    <Local:2:O.Data.2>
       ] [         ]/[                                                          ( )
```

SETS AUTO MODE

```
2    AUTO_PB     SYS_START   MANUAL_MODE                                     AUTO_MODE
       ] [         ] [          ]/[                                             ( )
                                                                            LT_AUTO_MODE
     AUTO_MODE   STOP_PB                                                     <Local:2:O.Data.3>
       ] [         ]/[                                                          ( )
```

(End)

STARTS 5S TIMER IF TANK LEVEL < 20%

0

LES	
Source A	TANK_LEVEL
	0.0
Source B	20

SYS_START   MANUAL_MODE

SYS_START   AUTO_MODE

TON	
Timer	PUMP_DELAY_TIMER
Preset	5000
Accum	0

(EN)
(DN)

1

PUMP_DELAY_TIMER.DN   TRIGGER_PUMP
( )

STARTS 5S TIMER IF TANK LEVEL > 80%

2

GRT	
Source A	TANK_LEVEL
	0.0
Source B	80

SYS_START   MANUAL_MODE

SYS_START   AUTO_MODE

TON	
Timer	PUMP_STOP_DELAY_TIMER
Preset	5000
Accum	0

(EN)
(DN)

3

PUMP_STOP_DELAY_TIMER.DN   TRIGGER_PUMP_STOP
( )

LATCHES PUMP ON BASED ON TRIGGER AND SYSTEM CONDITIONS

4

TRIGGER_PUMP   PUMP
( )

PUMP   STOP_PB   TRIGGER_PUMP_STOP   LL_ALARM   HH_ALARM

TURNS ON VFD WHEN PUMP STARTS

5

PUMP   VFD
( )

MANUAL SPEED CONTROL OF VFD IN MANUAL MODE

6

MANUAL_MODE   PUMP

MOV	
Source	MANUAL_VFD_SPEED
	0.0
Dest	VFD_SPEED
	0.0

7

MOV	
Source	FLOW_SP
	0.0
Dest	PID_CTRL.SP
	0.0

PID LOOP TO CONTROL VFD SPEED IN AUTO MODE

8

PUMP   AUTO_MODE

PID	
PID	PID_CTRL [...]
Process Variable	FLOW_LEVEL
Tieback	0
Control Variable	VFD_SPEED
PID Master Loop	0
Inhold Bit	0
Inhold Value	0
Setpoint	0.0
Process Variable	0.0
Output %	0.0

(End)

SETS LOW LEVEL ALARM AND NOTIFICATION IF TANK LEVEL STAYS < 10% FOR 5S

0

```
LES
Source A   TANK_LEVEL
                  0.0
Source B         10
```

```
TON
Timer    LL_ALARM_DELAY    (EN)
Preset              5000    (DN)
Accum                  0
```

1

LL_ALARM_DELAY.DN   ONS_LL   TRIGGER_LL_ALM
      ┤ ├   ┤ONS├   ( )

LATCHES ALARM NOTIFICATIONS UNTILL OPERATOR ACKNOWLEDGES IT

2

TRIGGER_LL_ALM   LL_NOTIFICATION
      ┤ ├   ( )

LL_NOTIFICATION   RESET_ALARM
      ┤ ├   ┤/├

LATCHES LL_ALARM

3

TRIGGER_LL_ALM   LL_ALARM
      ┤ ├   ( )

LL_ALARM   LES   RESET_ALARM
  ┤ ├   Source A   TANK_LEVEL   ┤/├
                            0.0
           Source B   10

SETS HIGH LEVEL ALARM AND NOTIFICATION IF TANK LEVEL STAYS < 90% FOR 5S

4

```
GRT
Source A   TANK_LEVEL
                  0.0
Source B         90
```

```
TON
Timer    HH_ALARM_DELAY    (EN)
Preset              5000    (DN)
Accum                  0
```

5

HH_ALARM_DELAY.DN   ONS_HH   TRIGGER_HH_ALM
      ┤ ├   ┤ONS├   ( )

LATCHES ALARM NOTIFICATIONS UNTILL OPERATOR ACKNOWLEDGES IT

6

TRIGGER_HH_ALM   HH_NOTIFICATION
      ┤ ├   ( )

HH_NOTIFICATION   RESET_ALARM
      ┤ ├   ┤/├

LATCHES HH_ALARM

7

TRIGGER_HH_ALM   HH_ALARM
      ┤ ├   ( )

HH_ALARM   GRT   RESET_ALARM
  ┤ ├   Source A   TANK_LEVEL   ┤/├
                            0.0
           Source B   90

(End)