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Rotork Actuators on Black Liquor Recovery Boilers

Contents

Section 1

Introduction and Rotork Supply History

Rotork has been supplying Electric motor operators on Black Liquor recovery boilers for over four decades. Over this period of time our products have undergone improvements in design that have increased reliability as well as flexibility of application.

These design improvements have followed the general migration of industrial equipment from hardwire technology to printed circuit and microprocessor technology. Rotork has undertaken this process incrementally and cautiously over the years. Originally the 1400 series wiring on our A range actuator was entirely hardwired. In the early 1980's we introduced the 1600 series A range that incorporated some solid-state controls and enhanced features such as automatic phase correction and enhance versatility of control. Many of these features were then complemented with the introduction of the IQ series in the early 1990's. The main advance was the introduction of non-intrusive control setting. This enabled the settings of the actuator to be confirmed or adjusted without a removal of electrical covers. The benefit being that no dirt or moisture could contaminate the internals of the actuator degrading its inherent reliability.

A further refinement of the IQ, designated IQ Mk. 2 was introduced in 2000. This actuator includes as standard a data logger so operational history can be downloaded to monitor performance and facilitate asset management features such as preventive or predictive maintenance.

With these changes in our products have come some changes in the methods of installation and set-up. The requirements for Black Liquor recovery boilers are quite specific as defined in BLRBAC good practice. We have revisited these requirements and combined this with our experience to come up with the attached recommendations for wiring hook up and settings on our actuators.

We hope that this document will act as a definitive reference manual for the application of Rotork actuators on Black Liquor recovery boiler valves.

Glossary

ESP – Emergency shutdown procedure – As referenced in BLRBAC recommended good practice.
ESD – Emergency shut down – As referenced in Rotork literature.

Section 2

Clarification of Application of the IQ Mk. 1 and Mk. 2

There have been several questions regarding the Rotork ESD connections used for the ESP function and the battery functions of the Rotork IQ units. Below are some answers to most frequently asked questions.

Battery

1. **Why does Rotork use a battery in its IQ actuators?**
   An LCD display is used to give position and other information locally at the actuator. There needs to be some form of back up power to provide this display should the main AC power be lost. Additionally, the remote indication in the control room needs to be updated should the actuator be operated manually during loss of main power. The battery provides back up power for the LCD and the remote position indicating relays. There is a position processor in the IQ actuator that provides incremental position indication between fully open and fully closed. This position processor will also be updated by the battery should the valve be manually operated during a power outage. For these three reasons it is important to have the battery to provide power on loss of main AC power.

2. **Will the actuator operate after a power interruption?**
   If power is interrupted to the actuator there will be no effect on its operation. However, if power is lost and the battery is low then again there will be no impact on the actuator provided the correct settings are made. This means that the "power loss inhibit" needs to be disabled per setting instructions attached. See also the decision table in section 3.

3. **Will the settings be lost in the actuator on power down with a low battery?**
   No. The actuator settings are in non-volatile RAM. With a complete lack of power, the settings remain the same and do not default to the original factory defaults. On power up the required settings will be reactivated. If the actuator is moved while it is powered down, then only the end of travel switch settings will need to be reset. See also the decision table in section 3.

4. **Will the settings be lost if the battery is changed with power down?**
   No. Settings will not be lost, and end of travel position will not be affected providing the actuator is not moved during battery change out.

5. **Can the battery condition be detected and monitored on both Mk. 1 and Mk. 2 IQ's?**
   The battery condition can be checked locally on the actuator indicator display. The battery low condition can be monitored remotely as well. See Section 4, Matrix of features, for relevant pages of instruction literature.

6. **How often do the batteries need to be changed?**
   The shelf life of a battery is seven years. Recommendation is that batteries be changed every three to five years.

7. **Does anything need to be done to the actuator after a power outage?**
   Usually nothing needs to be done to the actuator after a power outage. Whether the battery is present or not. Assuming that the actuator has been set up with the power loss inhibit disabled.
   See the decision table in section 3.

ESD Terminals for ESP Operation

1. **Why does Rotork have separate terminals for ESD?**
   These terminals are a way of ensuring that under emergency conditions (ESP) the actuator will go to the desired position. All models except 1400 series A range have dedicated ESD terminals. The 1400 series A range can be wired to provide ESD function. See Section 5 Subsection 1.

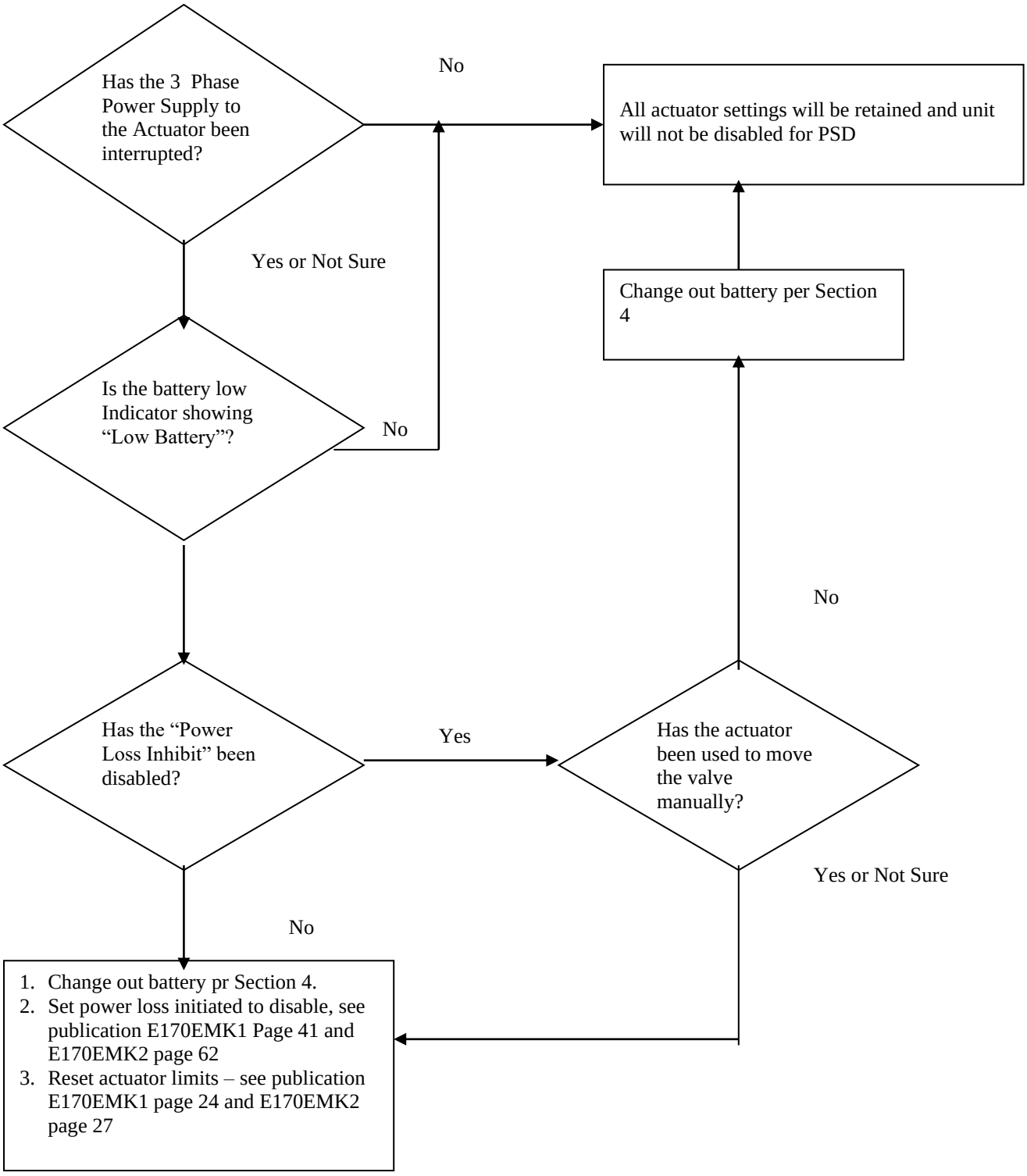
2. **Will the actuator operate the valve during an ESP if the local selector is in the stop or local position?**
   All actuators can be wired for ESD/ESP. However, for A Range 1600 series & IQ Mk1 if the local stop is selected the ESD will be disabled. The local stop position can be detected by the monitor relay which is standard for those models. This monitor relay can be connected to an alarm, indicating the non availability of the actuator. Alternatively, the actuator can be modified by adding a PC board that will allow the bypass function. This is a factory service modification.

3. **Can the ESD override external interlocks?**
   The 1400 series A range hookup will bypass interlocks.
   The IQ Mk. 2 can be programmed so that the ESD overrides external interlocks.
   The IQ Mk. 1 & 1600 series A range would need external field wiring to achieve this function.

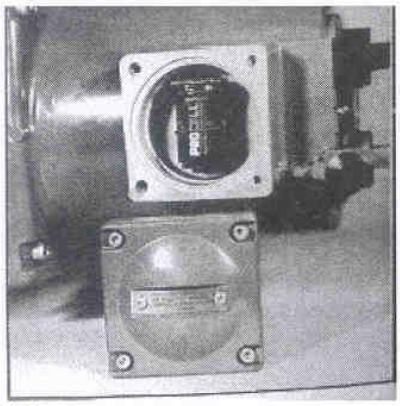
4. **Stall Timer what is it?**
   The stall timer is present on IQ MKI and MKII. If the motor is energized but the actuator does not move (jammed valve or other cause) then the stall timer will normally de-energize the motor to prevent damage. This stall timer can be bypassed by setting it to a maximum time to ensure the greatest effort has been applied to a rapid drain valve to open it.

Section 3 Decision Table

IQ MK1 and MK2 Decision Table For Remedial Action in the Event of Power Interruption



Battery Change Out Procedure for IQ Mk1 Actuators



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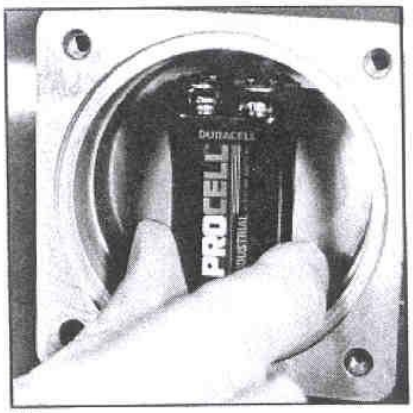
For non hazardous areas (WT) the power may be left on the actuator during battery change out.

Battery

While the actuator is in for maintenance it is recommended that its battery be changed, this is situated in its own compartment to the left of the pushbuttons. Remove the four fixing screws using a 4mm allen key, pull off cover.

Unclip battery and replace with new item, two types are fitted as original equipment:-



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For CENELEC Enclosure

Must only use a Duracell Procell MN 1604 alkaline battery. However, some countries outside of the EC which accept a basic CENELEC enclosure may demand a battery to suit their national specification, if in doubt then check.

For FM-CSA-WT Enclosures

Battery type Ultralife lithium cell is fitted.

Battery Change Out Procedure for IQ mk2 Actuators

Use an 8mm Allen key to remove the sealing plug, ensuring the "O" ring seal remains on the plug. Disconnect the battery wiring loom from the battery terminals. Using the black pull strap, lift the battery out of the rubber sealing pocket.

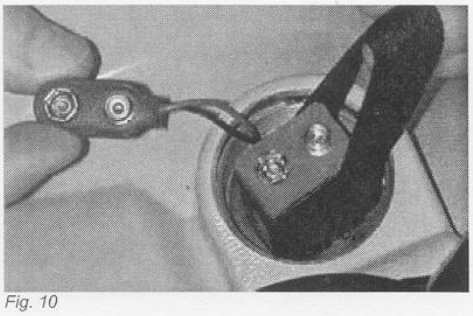


Fig. 10

For non hazardous areas (WT) the power may be left on the actuator during battery change out.

Battery Types

For European hazardous area certified actuators (ATEX) use an Ultralife U9VL lithium manganese dioxide battery only. For FM and CSA certified enclosures use an Ultralife U9VL lithium manganese dioxide battery. Equivalent, UL recognised, batteries may be used. For watertight (WT) actuator enclosures use an Ultralife U9VL lithium manganese dioxide battery or any equivalent 9V battery. If in doubt regarding the correct battery type, contact Rotork.

Fitting Replacement Battery

Fit the pull strap around the replacement battery and insert into the rubber sealing pocket. Reconnect the battery wiring loom to the battery terminals. Refit the battery sealing plug ensuring "O" ring is in good condition and correctly fitted. Hand tighten sealing plug using an 8mm Allen key.

Battery change out procedure of MK3 actuators

⚠ **WARNING:**

Battery Replacement

If the actuator is located within a hazardous area permission must be obtained in the form of a "hot work permit" or other local regulation before removal and/or replacement of the battery.

Removal of the battery with the main electrical power switched off will result in stored datalogger records time reference being lost for the duration when there is no mains and battery power. It is therefore recommended that the battery is replaced with the main electrical supply to the actuator switched on.

Battery Removal

The actuator must be selected to Stop using the red selector – refer to section 4.3. Access to the battery is via a labelled sealing plug situated on the main gearcase near the handwheel hub.

Remove the sealing plug using the appropriate Allen key, ensuring the O-ring seal remains on the plug. Disconnect the battery wiring loom from the battery terminals. Using the black pull strap, lift the battery out of the rubber sealing pocket.

Fig. 9.8.1

Battery Types

For International, EU and UK hazardous area certified actuators, use a lithium manganese dioxide battery as stated in Fig. 9.8.2 Battery Type Table.

For USA and Canada hazardous area certified actuators, use an Ultralife U9VL lithium manganese dioxide battery. Equivalent, UL recognised, batteries may be used.

For non hazardous actuators, Rotork recommend a lithium manganese dioxide battery, however any equivalent 9V battery may be used.

If in doubt regarding the correct battery type, contact Rotork.

Enclosure Type	Battery Type	Detail
Standard Temp	Ultralife PP3 Types	U9VL or U9VL-J-P
Low/High Temp	Rotork Part Numbers:	95-462 or 95-614

Fig. 9.8.2 Battery Type Table

Fitting Replacement Battery

Fit the pull strap around the replacement battery and insert into the rubber sealing pocket. Reconnect the battery wiring loom to the battery terminals. Refit the battery sealing plug ensuring O-ring is in good condition and correctly fitted. Hand tighten the sealing plug to 8 Nm (6 lbs/ft) using the appropriate Allen key.

Oil

Unless specially ordered for extreme climatic conditions, Rotork actuators are dispatched with gearcases filled with SAE 80EP oil which is suitable for ambient temperatures ranging from -30 to +70 °C (-22 to +160 °F).

IQ actuators do not require regular oil changes (refer to Section 11, Weights and Measures).

Torque and Position Monitoring

The IQ range of actuators incorporate real time, instantaneous Torque & Position monitoring as standard. Torque & Position can be used to monitor valve performance during operation. The effect of process changes (differential pressure etc.) can be evaluated, tight spots in valve travel can be pinpointed as well as gauging the torque developed through stroke

	Rapid Drain Valve Setup Recommendations							
	1400		1600		IQ MK1		IQ Mk 2	
Rotork Actuator Model								
ESD dedicated terminal for an ESP	Yes with Hook up	Must be wired to provide ESD function. Section 6.1	Yes		Yes		Yes	
Does the ESD override external interlocks during an ESP	Yes with Hook Up	Must be wired to override interlock function. Section 6.1	Caution	This must be done by external wiring	Caution	This must be done by external wiring	Select	
Power interruption must not inhibit motion	N/A		N/A		Select	See publication E170E Mark1 page 42	Select	See publication E170E3 Mark1 page 62
Local battery indication	N/A		N/A		Yes	See publication E170E Mark1 page 52	Yes	See publication E170E3 Mark1 page 6
Remote battery indication	N/A		N/A		Yes	See publication E170E Mark1 page 29	Yes	See publication E170E3 Mark1 page 32
Settings retained on total power down	Yes		Yes		Yes	See section 3	Yes	See “Section 3
Local stop must not inhibit ESP	Ye4s with Hook up	Must be wired to override local stop. Section 6.1	Factory service modification	Modify by adding PC board, Also “:Local stop” can be indicated by Monitor Relay.	Factory Service Modification	Factory service can modify by adding PC board, Also “Local stop” can be indicated by Monitor relay.	Select	See publication E170E3 Mark1 page 35
Password protection available on settings	No		No		Yes	See publication E170E Mark1 page 15	Yes	See publication E170E3 Mark1 page 18
Bypass torque switch in op[en direction	Yes, with Hook up	See setup section 6.1	Yes, with set up	See setup section 6.2	Select	See set up section 6.3	Select	See setup section 6.4
Disable “stalled motor” time out protection	N/A		N/A		Factory Service Modification	Factory service can modify by reprogramming with service tool	Factory Service Modification	Factory service can modify by reprogramming with service tool
Bypass thermostat for ESP	Yes, with Hook up	Must be wired to override thermostat. Section 6.1	Yes, with Hook up	Must be wired to override thermostat. Section 6.2	Select	See publication E170E Mark1 page 30	Select	See publication E170E3 Mark1 page 34 and Appendix 1

Feed Water Stop Valve Settings - 1400

Wiring Diagram: 1410-40	Hookup Drawing: WS18336

Recommended Settings:		Operating Manual E270E Section/Page		

Primary Settings:				
Direction To Close	Clock	As built		
Close Action	Torque	Section 5.13 / Page 10	Physical Setting	
Open Action	Limit	Section 5.13 / Page 10	Physical Setting	
Torque Valve Closing	By Application	Section 5.14 / Page 10	Physical Setting	
Torque Valve Opening	75% Rated Torque	Section 5.14 / Page 10	Physical Setting	
Close Limit	By Application	Section 5.12 / Page 7-10	Physical Setting	
Open Limit	By Application	Section 5.14 / Page 7-10	Physical Setting	

Indications Settings:				
Indication Contact CAS1	Make at Full Shut	As built		
Indication Contact OAS1	Make at Full Open	As built		
Indication Contact CAS2	Break at Full Shut	As built		
Indication Contact OAS2	Break at Full Open	As built		

Control Mode Settings:		
ESD Enabled	Enabled	By hookup reference WS18336
ESD Action	Closed	By hookup reference WS18336
ESD Contact Type	ESD on Applied Signal	By hookup reference WS18336
ESD Bypass Thermostat	Bypass Enabled	By hookup reference WS18336
ESD Override Interlocks	Override On	By hookup reference WS18336
ESD Override Local Stop	Override On	By hookup reference WS18336
Maintained Local Controls	Maintained	Standard Diagram Function
External Interlocks	Enabled	By hookup reference WS18336
Torque Switch Bypass	Enabled	Torque Latch in Anti-clock direction.

Options:				
Additional Indication Contacts	None			
CPT (Position Transmitter)	None			
Folomatic (Positioner)	None			
Bus System Interface	None			
Interrupter Timer	None			

Rapid Drain Valve Settings - 1400

Wiring Diagram: 1410-40	Hookup Drawing: WS18337

Recommended Settings:		Operating Manual E270E Section/Page		

Primary Settings:				
Direction To Close	Clock	As built		
Close Action	Torque	Section 5.13 / Page 10	Physical Setting	
Open Action	Limit	Section 5.13 / Page 10	Physical Setting	
Torque Valve Closing	By Application	Section 5.14 / Page 10	Physical Setting	
Torque Valve Opening	Boost / Motor Stall	Section 5.14 / Page 10	Physical Setting	
Close Limit	By Application	Section 5.12 / Page 7-10	Physical Setting	
Open Limit	By Application	Section 5.14 / Page 7-10	Physical Setting	

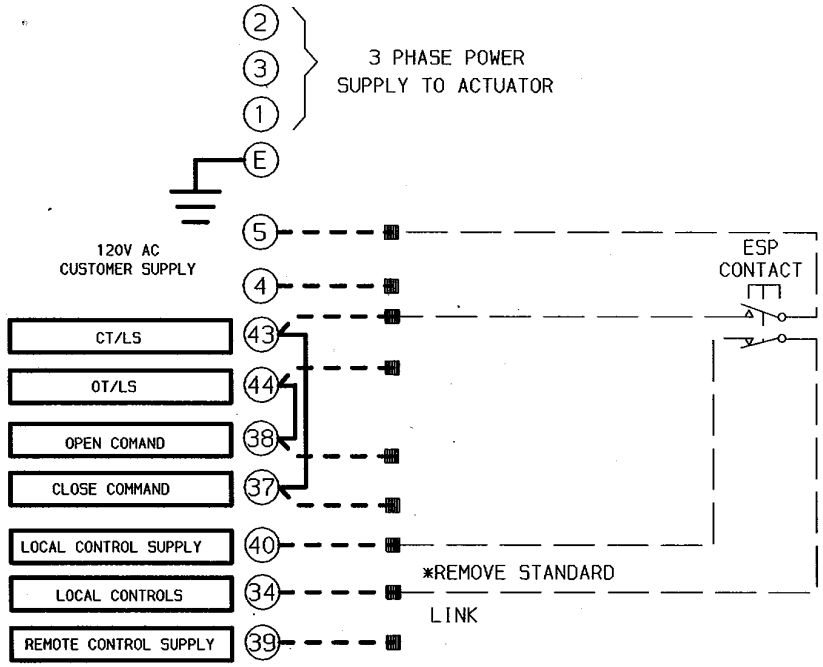
Indications Settings:				
Indication Contact CAS1	Make at Full Shut	As built		
Indication Contact OAS1	Make at Full Open	As built		
Indication Contact CAS2	Break at Full Shut	As built		
Indication Contact OAS2	Break at Full Open	As built		

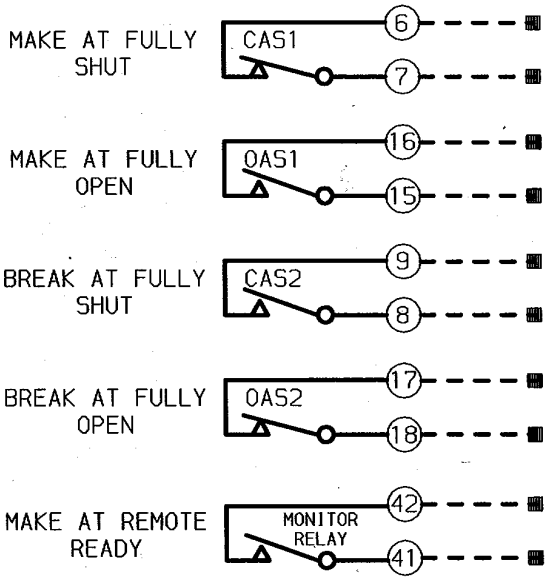
Control Mode Settings:		
ESD Enabled	Enabled	By hookup reference WS18337
ESD Action	Open	By hookup reference WS18337
ESD Contact Type	ESD on Applied Signal	By hookup reference WS18337
ESD Bypass Thermostat	Bypass Enabled	By hookup reference WS18337
ESD Override Interlocks	Override On	By hookup reference WS18337
ESD Override Local Stop	Override On	By hookup reference WS18337
Maintained Local Controls	Maintained	Standard Diagram Function
External Interlocks	Enabled	By hookup reference WS18337
Torque Switch Bypass	Enabled	Torque Latch in Anti-clock direction.

Options:				
Additional Indication Contacts	None			
CPT (Position Transmitter)	None			
Folomatic (Positioner)	None			
Bus System Interface	None			
Interrupter Timer	None			

RECOMMENDED HOOKUP FOR 'A' RANGE 1400 SERIES WIRING DIAGRAM 1410-40 FOR ESP (EMERGENCY SHUT-DOWN PROCEDURES) FOR FEED WATER STOP VALVES WHEN CONFIGURED TO ROTORK DOCUMENT DOC1572.

CIRCUIT DIAGRAM No
WS18336-02





ESP OPERATION WHEN CONFIGURED TO DOC1572

FEED WATER STOP VALVE: RUN FULL CLOSED

BYPASS MOTOR THERMOSTAT
BYPASS LOCAL OPEN
BYPASS LOCAL STOP
BYPASS LOCAL CLOSE
BYPASS OPEN INTERLOCK
BYPASS CLOSE INTERLOCK
BYPASS REMOTE OPEN
BYPASS REMOTE STOP
BYPASS REMOTE CLOSE

No	DATE	REVISION	No	DATE	REVISION
01	6/05	FIRST ISSUE			
02	090205	MODIFIED TITLE.			

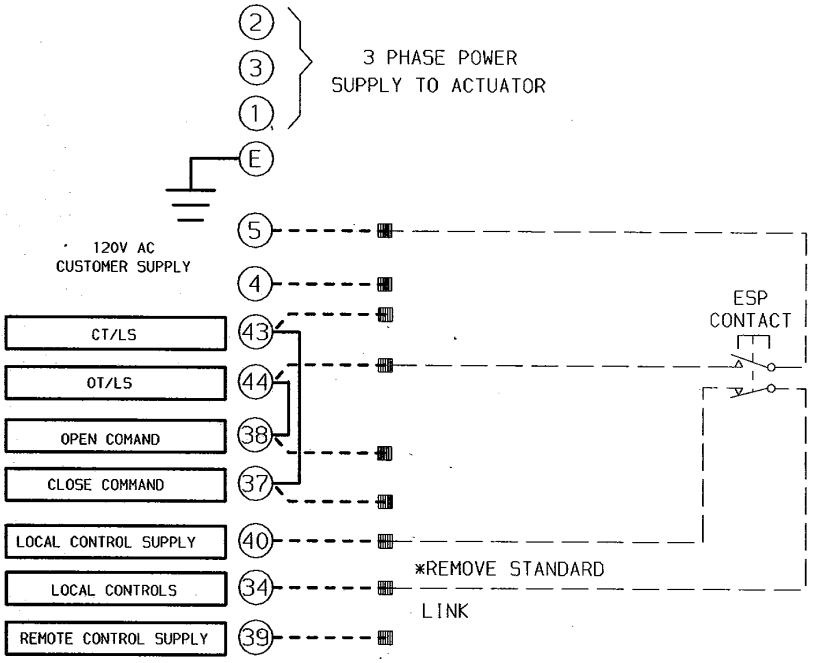
DRAWN TPW DATE 06/02/05 | CHECKED CW DATE 06/02/05 | 1410-40 FEED WATER STOP ESP HOOKUP PER DOC1572

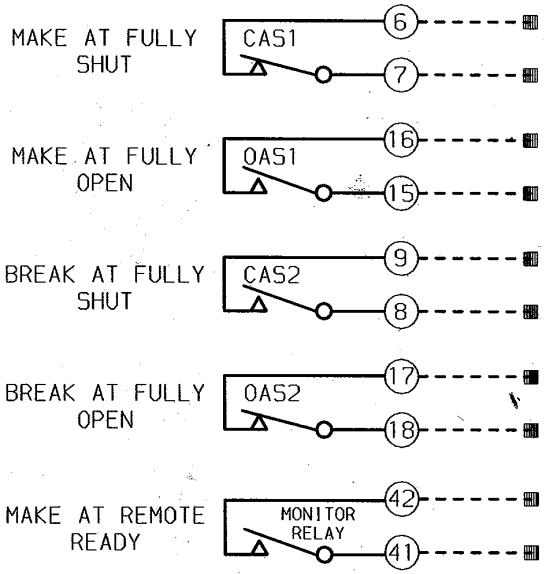
rotork ROTORK CONTROLS BATH UK. BA1 3JQ. tel(0225)28451. ROCHESTER, NY 14624

CIRCUIT DIAGRAM Z
WS18336-02

RECOMMENDED HOOKUP FOR 'A' RANGE 1400 SERIES WIRING DIAGRAM 1410-40 FOR ESP (EMERGENCY SHUT-DOWN PROCEDURES) FOR RAPID DRAIN VALVES WHEN CONFIGURED TO ROTORK DOCUMENT DOC1572.

CIRCUIT DIAGRAM No
WS18337-01





ESP OPERATION WHEN CONFIGURED TO DOC1572

RAPID DRAIN VALVE : RUN FULLY OPEN

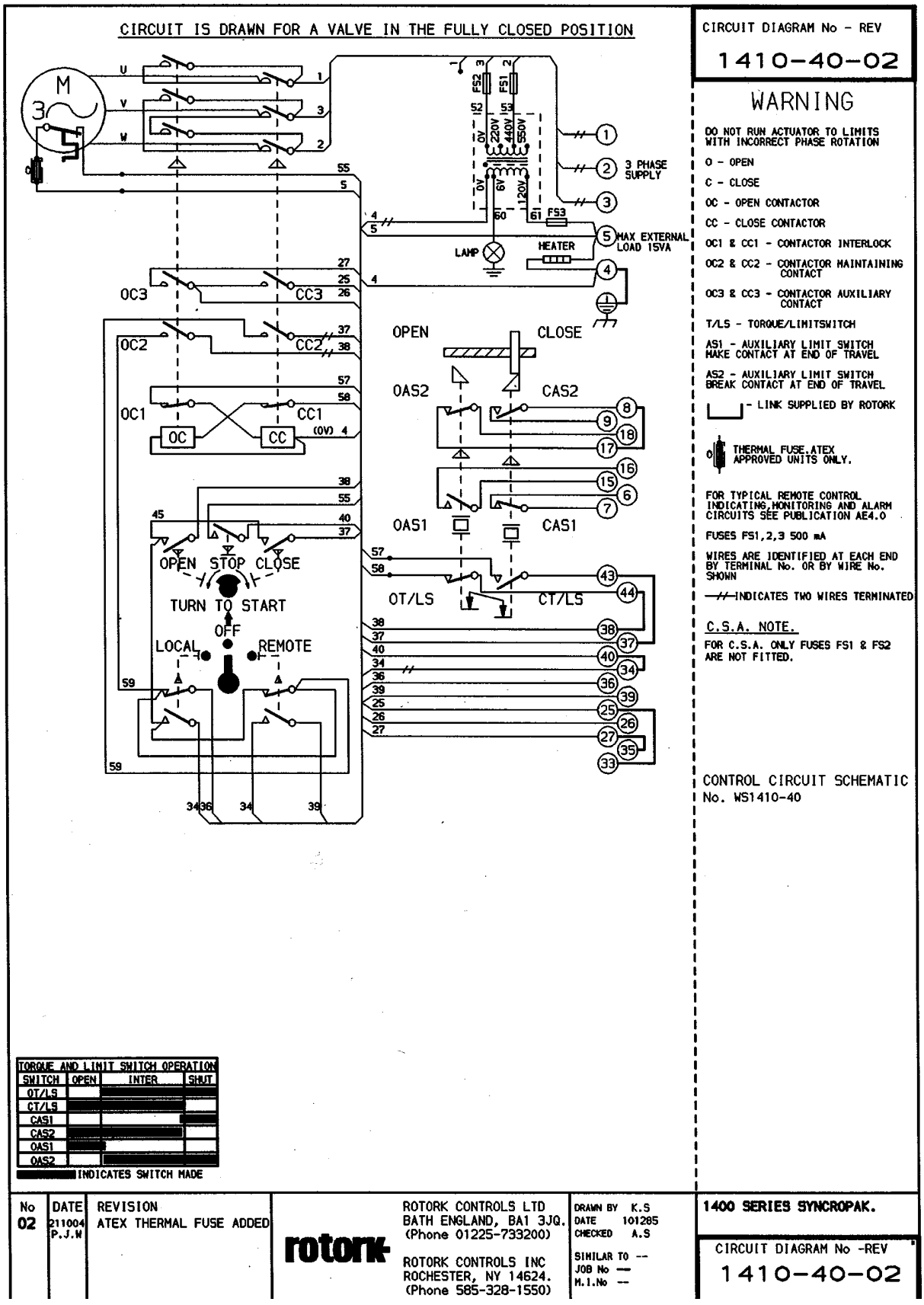
BYPASS MOTOR THERMOSTAT
BYPASS LOCAL OPEN
BYPASS LOCAL STOP
BYPASS LOCAL CLOSE
BYPASS OPEN INTERLOCK
BYPASS CLOSE INTERLOCK
BYPASS REMOTE OPEN
BYPASS REMOTE STOP
BYPASS REMOTE CLOSE

No	DATE	REVISION	No	DATE	REVISION
01	6/05	FIRST ISSUE			

DRAWN TPW DATE 06/02/05 | CHECKED CW DATE 06/02/05 | 1410-40 RAPID DRAIN ESP HOOKUP PER DOC1572

rotork ROTORK CONTROLS BATH UK. BA1 3JQ. tel(0225)28451. ROCHESTER, NY 14624 tel(716)328-1550

CIRCUIT DIAGRAM Z
WS18337-01


CIRCUIT IS DRAWN FOR A VALVE IN THE FULLY CLOSED POSITION
CIRCUIT DIAGRAM No - REV
1410-40-02
WARNING
DO NOT RUN ACTUATOR TO LIMITS WITH INCORRECT PHASE ROTATION
O - OPEN
C - CLOSE
OC - OPEN CONTACTOR
CC - CLOSE CONTACTOR
OC1 & CC1 - CONTACTOR INTERLOCK
OC2 & CC2 - CONTACTOR MAINTAINING CONTACT
OC3 & CC3 - CONTACTOR AUXILIARY CONTACT
T/LS - TORQUE/LIMITSWITCH
AS1 - AUXILIARY LIMIT SWITCH MAKE CONTACT AT END OF TRAVEL
AS2 - AUXILIARY LIMIT SWITCH BREAK CONTACT AT END OF TRAVEL
- LINK SUPPLIED BY ROTORK
THERMAL FUSE.ATEX APPROVED UNITS ONLY.
FOR TYPICAL REMOTE CONTROL INDICATING,MONITORING AND ALARM CIRCUITS SEE PUBLICATION AE4.0
FUSES FS1,2,3 500 mA
WIRES ARE IDENTIFIED AT EACH END BY TERMINAL No. OR BY WIRE No. SHOWN
INDICATES TWO WIRES TERMINATED
C.S.A. NOTE.
FOR C.S.A. ONLY FUSES FS1 & FS2 ARE NOT FITTED.
3 PHASE SUPPLY
MAX EXTERNAL LOAD 15VA
LAMP
HEATER
OPEN
CLOSE
OC3
CC3
OC2
CC2
OC1
CC1
OC
CC
OAS2
CAS2
OAS1
CAS1
OT/LS
CT/LS
OPEN STOP CLOSE
TURN TO START
OFF
LOCAL
REMOTE
CONTROL CIRCUIT SCHEMATIC
No. WS1410-40
TORQUE AND LIMIT SWITCH OPERATION
SWITCH OPEN INTER SHUT
OT/LS
CT/LS
CAS1
CAS2
OAS1
OAS2
INDICATES SWITCH MADE
No 02
DATE 211004 P.J.W
REVISION ATEX THERMAL FUSE ADDED
rotork
ROTORK CONTROLS LTD BATH ENGLAND, BA1 3JQ. (Phone 01225-733200)
ROTORK CONTROLS INC ROCHESTER, NY 14624. (Phone 585-328-1550)
DRAWN BY K.S
DATE 101285
CHECKED A.S
SIMILAR TO --
JOB No —
M.I.No --
1400 SERIES SYNCROPAK.
CIRCUIT DIAGRAM No -REV
1410-40-02

Feed Water Stop Valve Settings - 1600mk5

No Local Stop Bypass during ESP

Wiring Diagram: 1610X01	Hookup Drawing: WS18335

Recommended Settings:		Operating Manual E270E Section/Page		

Primary Settings:				
Direction To Close	Clock	AE4/2 / Page 10	SW1.5	On
Close Action	Torque	Section 5.13 / Page 10	Physical Setting	
Open Action	Limit	Section 5.13 / Page 10	Physical Setting	
Torque Valve Closing	By Application	Section 5.14 / Page 10	Physical Setting	
Torque Valve Opening	75% Rated Torque	Section 5.14 / Page 10	Physical Setting	
Close Limit	By Application	Section 5.12 / Page 7-10	Physical Setting	
Open Limit	By Application	Section 5.14 / Page 7-10	Physical Setting	

Indications Settings:				
Indication Contact CAS1	Make at Full Shut	As built		
Indication Contact OAS1	Make at Full Open	As built		
Indication Contact CAS2	Break at Full Shut	As built		
Indication Contact OAS2	Break at Full Open	As built		

Control Mode Settings:				
ESD Enabled	Enabled	AE4/2 / Page 10	SW1.7	On
ESD Action	Close	AE4/2 / Page 10	SW1.3	On
ESD Contact Type	ESD on Applied Signal			
ESD Bypass Thermostat	Bypass Enabled	AE4/2 / Page 10	SW1.8	On
ESD Override Interlocks	Override On	Setting Not Available		
ESD Override Local Stop	Override On	Setting Not Available		
Maintained Local Controls	Maintained	AE4/2 / Page 10	SW1.4	On
Two Wire Priority	Close Priority	AE4/2 / Page 10	SW2.3	On
			SW2.4	On
External Interlocks	Enabled	AE4/2 / Page 10	SW2.1	Off
			SW2.2	Off
Stall Time	Max Time	AE4/2 / Page 10	SW1.6	Off
Stall Timer	Enabled	AE4/2 / Page 10	SW2.5	On
Local Stop Bypass	Bypass Enabled	Setting Not Available		
Torque Switch Bypass	Enabled	Torque Latch in Anti-clock direction.		

Options:				
Additional Indication Contacts	None			
CPT (Position Transmitter)	None			
Folomatic (Positioner)	None			
Remote Control Source	None			
Bus System Interface	None			
Interrupter Timer	None	AE4/2 / Page 10	SW1.1	Off

Rapid Drain Valve Settings - 1600mk5

No Local Stop Bypass during ESP

Wiring Diagram: 1610X01	Hookup Drawing: WS18335

Recommended Settings:		Operating Manual E270E Section/Page		

Primary Settings:				
Direction To Close	Clock	AE4/2 / Page 10	SW1.5	On
Close Action	Torque	Section 5.13 / Page 10	Physical Setting	
Open Action	Limit	Section 5.13 / Page 10	Physical Setting	
Torque Valve Closing	By Application	Section 5.14 / Page 10	Physical Setting	
Torque Valve Opening	Boost / Motor Stall	Section 5.14 / Page 10	Physical Setting	
Close Limit	By Application	Section 5.12 / Page 7-10	Physical Setting	
Open Limit	By Application	Section 5.14 / Page 7-10	Physical Setting	

Indications Settings:				
Indication Contact CAS1	Make at Full Shut	As built		
Indication Contact OAS1	Make at Full Open	As built		
Indication Contact CAS2	Break at Full Shut	As built		
Indication Contact OAS2	Break at Full Open	As built		

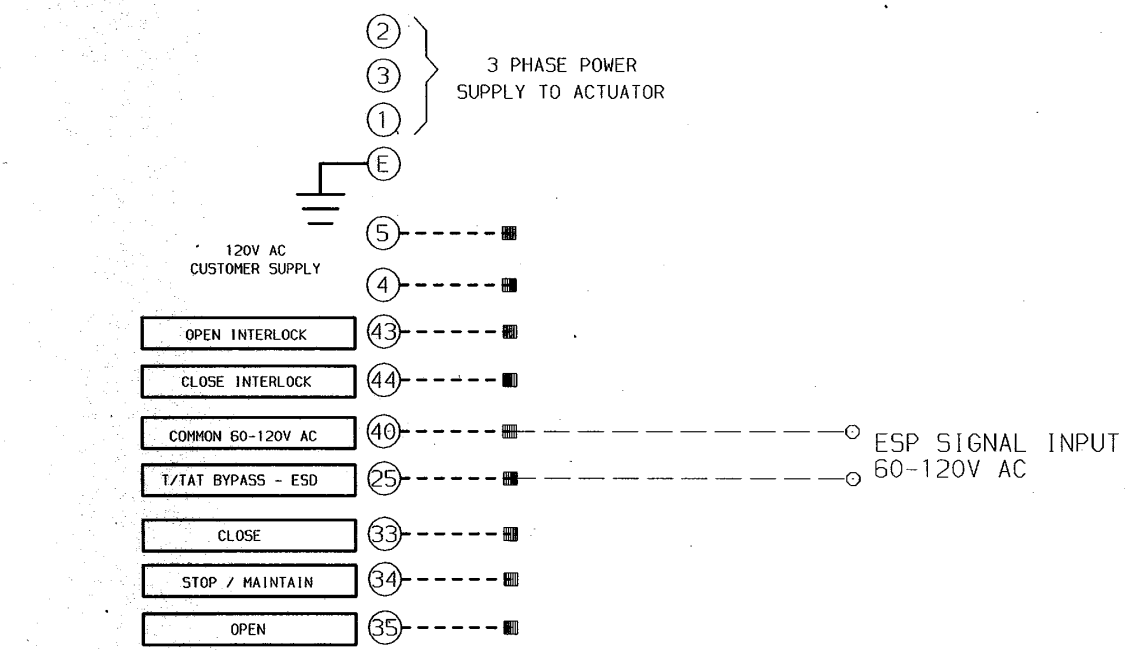
Control Mode Settings:				
ESD Enabled	Enabled	AE4/2 / Page 10	SW1.7	On
ESD Action	Open	AE4/2 / Page 10	SW1.3	Off
ESD Contact Type	ESD on Applied Signal			
ESD Bypass Thermostat	Bypass Enabled	AE4/2 / Page 10	SW1.8	On
ESD Override Interlocks	Override On	Setting Not Available		
ESD Override Local Stop	Override On	Setting Not Available		
Maintained Local Controls	Maintained	AE4/2 / Page 10	SW1.4	On
Two Wire Priority	Close Priority	AE4/2 / Page 10	SW2.3	On
			SW2.4	On
External Interlocks	Enabled	AE4/2 / Page 10	SW2.1	Off
			SW2.2	Off
Stall Time	Max Time	AE4/2 / Page 10	SW1.6	Off
Stall Timer	Enabled	AE4/2 / Page 10	SW2.5	On
Local Stop Bypass	Bypass Enabled	Setting Not Available		
Torque Switch Bypass	Enabled	Torque Latch in Anti-clock direction.		

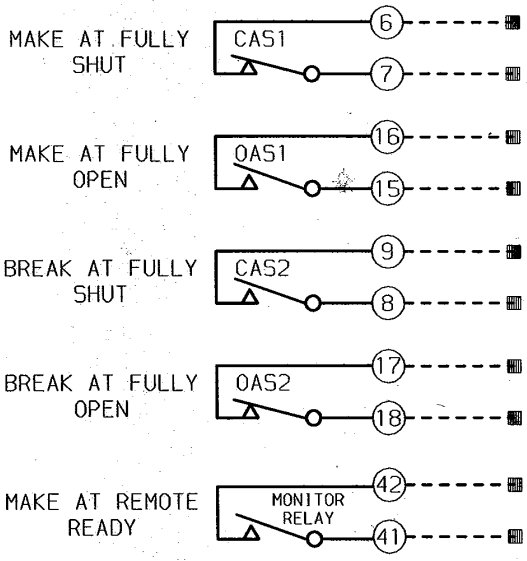
			SW1.2	Off

Options:				
Additional Indication Contacts	None			
CPT (Position Transmitter)	None			
Folomatic (Positioner)	None			
Remote Control Source	None			
Bus System Interface	None			
Interrupter Timer	None	AE4/2 / Page 10	SW1.1	Off

RECOMMENDED HOOKUP FOR 1600mk5 WIRING DIAGRAM 1610X01
FOR ESP (EMERGENCY SHUT-DOWN PROCEDURES) FOR
FEED WATER STOP AND RAPID DRAIN VALVES WHEN CONFIGURED TO
ROTORK DOCUMENT DOC1572.

CIRCUIT DIAGRAM No
WS18393-02





ESP OPERATION WHEN CONFIGURED TO DOC1572

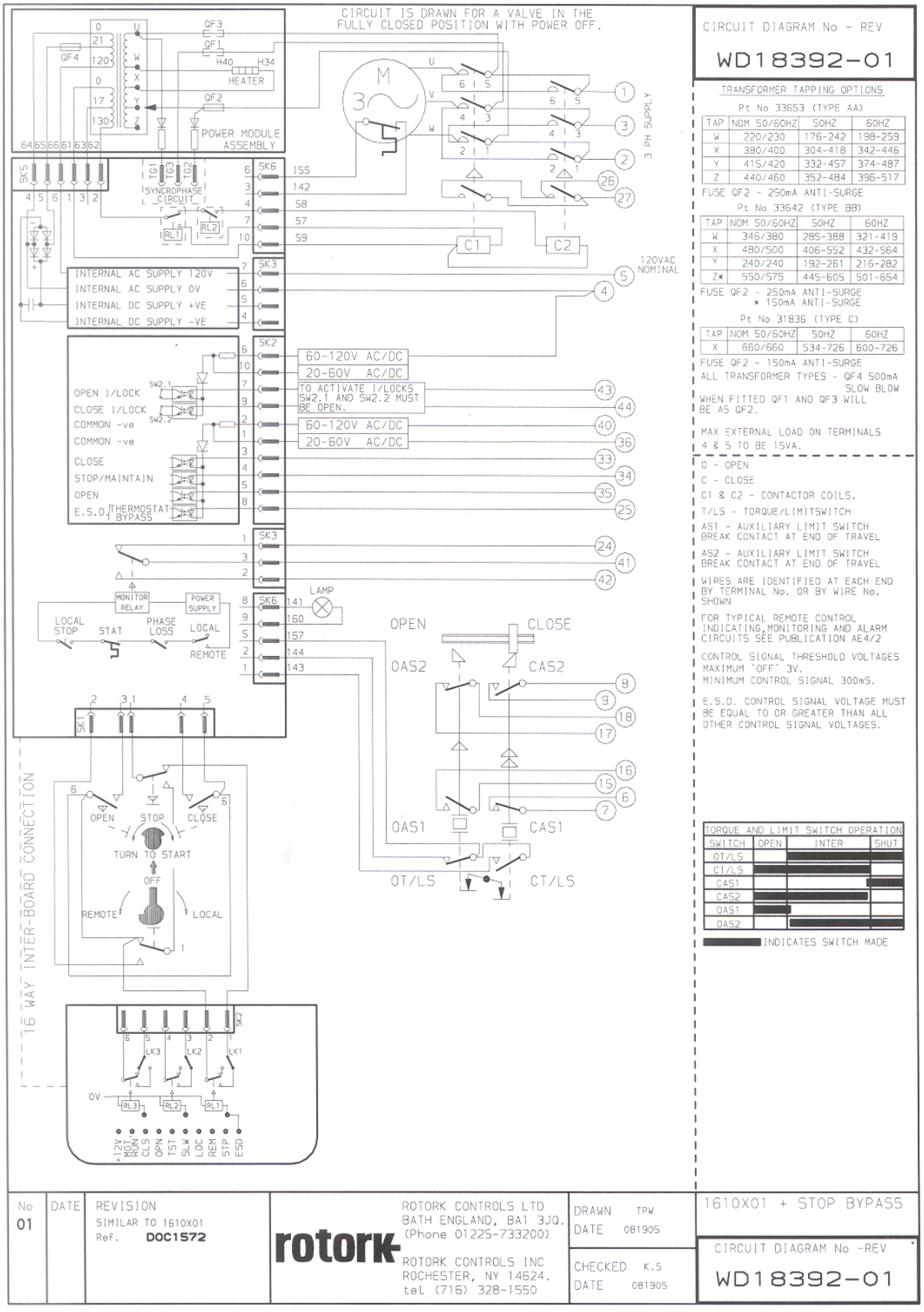
FEED WATER STOP VALVE: RUN FULL CLOSED
RAPID DRAIN VALVE : RUN FULL OPEN

BYPASS MOTOR THERMOSTAT
BYPASS LOCAL OPEN
BYPASS LOCAL CLOSE
BYPASS REMOTE OPEN
BYPASS REMOTE STOP
BYPASS REMOTE CLOSE
BYPASS LOCAL STOP
*DOES NOT BYPASS INTERLOCKS

No	DATE	REVISION	No	DATE	REVISION	DRAWN TPW DATE 08/19/05	CHECKED CW DATE 08/19/05	WD18392 ESP HOOKUP PER DOC1572
01	8/05	FIRST ISSUE						
02	090205	MODIFIED TITLE.						

rotork
ROTORK CONTROLS
BATH UK. BA1 3JQ.
tel(0225)28451.
ROCHESTER, NY
14624
tel(716)328-1550

CIRCUIT DIAGRAM Z
WS18393-02


CIRCUIT IS DRAWN FOR A VALVE IN THE FULLY CLOSED POSITION WITH POWER OFF.
CIRCUIT DIAGRAM No - REV
WD18392-01
TRANSFORMER TAPPING OPTIONS
Pt No 33653 (TYPE AA)
TAP | NOM 50/60HZ | 50HZ | 60HZ
W | 220/230 | 176-242 | 198-259
X | 380/400 | 304-418 | 342-446
Y | 415/420 | 332-457 | 374-487
Z | 440/460 | 352-484 | 396-517
FUSE QF2 - 250mA ANTI-SURGE
Pt No 33642 (TYPE BB)
TAP | NOM 50/60HZ | 50HZ | 60HZ
W | 345/380 | 285-388 | 321-419
X | 480/500 | 406-552 | 432-564
Y | 240/240 | 192-261 | 216-282
Z* | 550/575 | 445-605 | 501-654
FUSE QF2 - 250mA ANTI-SURGE
* 150mA ANTI-SURGE
Pt No 31836 (TYPE C)
TAP | NOM 50/60HZ | 50HZ | 60HZ
X | 660/660 | 534-726 | 600-726
FUSE QF2 - 150mA ANTI-SURGE
ALL TRANSFORMER TYPES - QF4 500mA SLOW BLOW
WHEN FITTED QF1 AND QF3 WILL BE AS QF2.
MAX EXTERNAL LOAD ON TERMINALS 4 & 5 TO BE 15VA.
O - OPEN
C - CLOSE
C1 & C2 - CONTACTOR COILS.
T/LS - TORQUE/LIMITSWITCH
AS1 - AUXILIARY LIMIT SWITCH BREAK CONTACT AT END OF TRAVEL
AS2 - AUXILIARY LIMIT SWITCH BREAK CONTACT AT END OF TRAVEL
WIRES ARE IDENTIFIED AT EACH END BY TERMINAL No. OR BY WIRE No. SHOWN
FOR TYPICAL REMOTE CONTROL INDICATING, MONITORING AND ALARM CIRCUITS SEE PUBLICATION AE4/2
CONTROL SIGNAL THRESHOLD VOLTAGES MAXIMUM 'OFF' 3V. MINIMUM CONTROL SIGNAL 300mS.
E.S.D. CONTROL SIGNAL VOLTAGE MUST BE EQUAL TO OR GREATER THAN ALL OTHER CONTROL SIGNAL VOLTAGES.
TORQUE AND LIMIT SWITCH OPERATION
SWITCH | OPEN | INTER | SHUT
OT/LS
CT/LS
CAS1
CAS2
OAS1
OAS2
INDICATES SWITCH MADE
3 PH SUPPLY
120VAC NOMINAL
INTERNAL AC SUPPLY 120V
INTERNAL AC SUPPLY 0V
INTERNAL DC SUPPLY +VE
INTERNAL DC SUPPLY -VE
60-120V AC/DC
20-60V AC/DC
TO ACTIVATE I/LOCKS SW2.1 AND SW2.2 MUST BE OPEN.
OPEN I/LOCK
CLOSE I/LOCK
COMMON -ve
CLOSE
STOP/MAINTAIN
OPEN
E.S.D. THERMOSTAT BYPASS
LAMP
MONITOR RELAY
POWER SUPPLY
LOCAL STOP
STAT
PHASE LOSS
LOCAL
REMOTE
TURN TO START
OFF
16 WAY INTER-BOARD CONNECTION
+12V
INT
RUN
CLS
OPN
TST
SLW
LOC
REM
STP
ESD
No 01
DATE
REVISION
SIMILAR TO 1610X01
Ref. DOC1572
ROTORK CONTROLS LTD
BATH ENGLAND, BA1 3JQ.
(Phone 01225-733200)
ROTORK CONTROLS INC
ROCHESTER, NY 14624.
tel (716) 328-1550
DRAWN TPW
DATE 081905
CHECKED K.S
DATE 081905
1610X01 + STOP BYPASS
CIRCUIT DIAGRAM No -REV
WD18392-01

Feed Water Stop Valve Settings - IQ

No Local Stop Bypass during ESP

Wiring Diagram: 200-001	Hookup Drawing: WS18334

Recommended Settings:		Operating Manual E170E Section/Page	Screen	Setting
Primary Settings:				
Direction To Close	Clock	Section 8/ Page 19	C1	C
Close Action	Torque	Section 8/ Page 20	C2	Ct
Open Action	Limit	Section 8/ Page 21	C3	OL
Torque Valve Closing	By Application	Section 8/ Page 22	tC	% Rated
Torque Valve Opening	75% Rated Torque	Section 8/ Page 23	tO	75
Close Limit	By Application	Section 8/ Page 24	LC	
Open Limit	By Application	Section 8/ Page 24	LO	
Indications Settings:				
Indication Contact 1	Make at Full Shut	Section 9.2/ Page 28	R1	CL / no
Indication Contact 2	Make at Full Open	Section 9.2/ Page 28	R2	OP / no
Indication Contact 3	Break at Full Shut	Section 9.2/ Page 28	R3	CL / nc
Indication Contact 4	Break at Full Open	Section 9.2/ Page 28	R4	OP / nc
Control Mode Settings:				
ESD Enabled	Enabled	Section 9.3/ Page 29	A1	on
ESD Action	Close	Section 9.3/ Page 29	A2	CL
ESD Contact Type	ESD on Applied Signal	Section 9.3/ Page 29	A3	no
ESD Bypass Thermostat	Bypass Enabled	Section 9.3/ Page 30	A4	on
ESD Override Interlocks	Override On	Setting Not Available		
ESD Override Local Stop	Override On	Setting Not Available		
Maintained Local Controls	Maintained	Section 9.3/ Page 30	A5	on
Two Wire Priority	Close Priority	Section 9.3/ Page 30	A6	OF
			A7	OF
External Interlocks	Enabled	Section 9.3/ Page 31	A8	on
Display Invert	Disabled	Section 9.3/ Page 31	A9	OF
Torque Switch Bypass	Enabled	Default program setting not available.		
Options:				
Additional Indication Contacts	None			
CPT (Position Transmitter)	None	Section 9.8/ Page 38	OI	OF
Folomatic (Positioner)	None	Section 9.4/ Page 32	OF	OF
Remote Control Source	None			
Bus System Interface	None	Section 9.5/ Page 35	OP	OF
Interrupter Timer	None	Section 9.6/ Page 39	OJ	OF
Setting Tool – Local Control	Disabled	Section 9.7/ Page 41	Or	OF
Power Loss Inhibit.	Disabled	Section 9.9/ Page 42	OS	OF

Rapid Drain Valve Settings - IQ

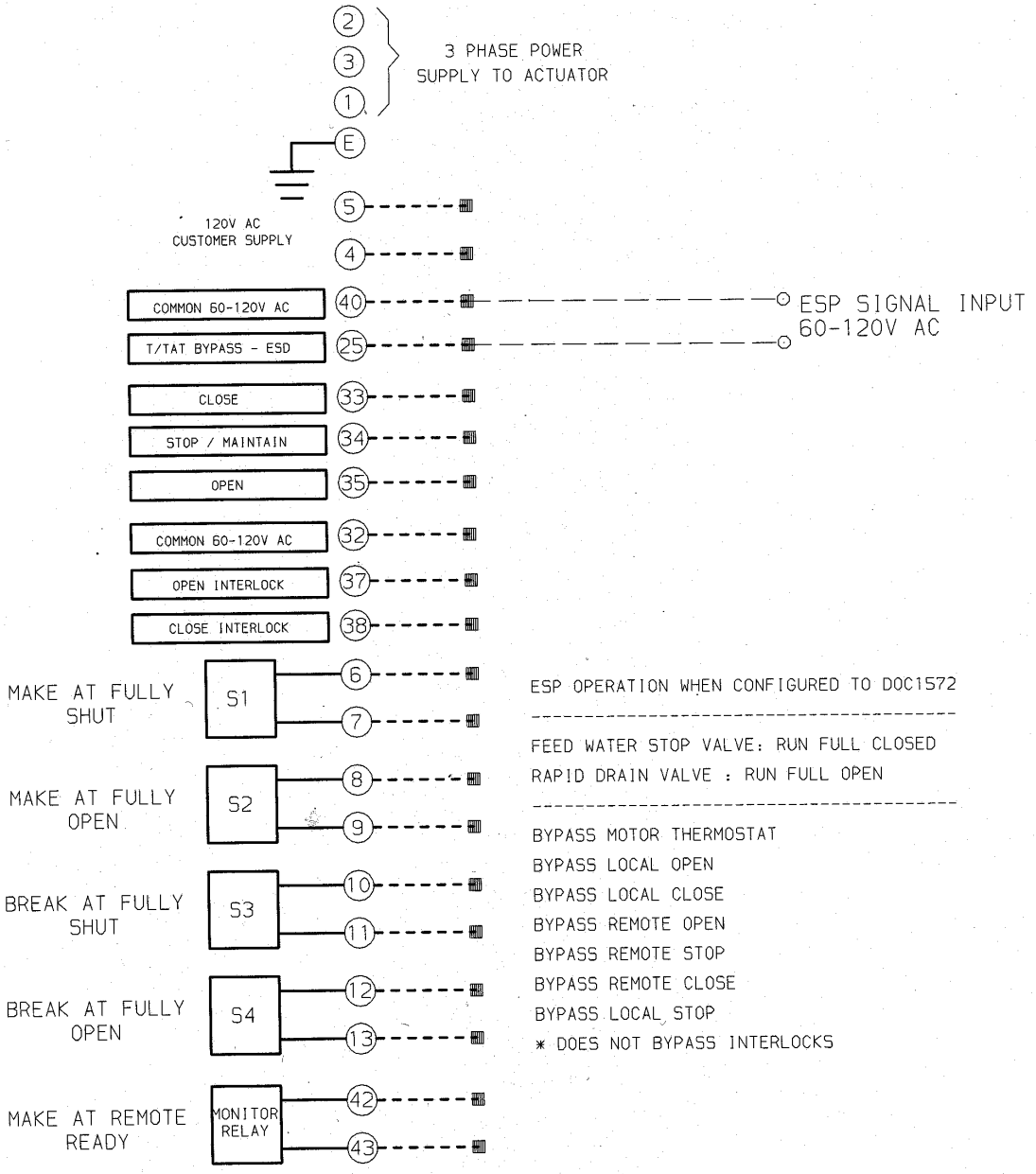
No Local Stop Bypass during ESP

Wiring Diagram: 200-001	Hookup Drawing: WS18334

Recommended Settings:		Operating Manual E170E Section/Page	Screen	Setting
Primary Settings:				
Direction To Close	Clock	Section 8/ Page 19	C1	C
Close Action	Torque	Section 8/ Page 20	C2	Ct
Open Action	Limit	Section 8/ Page 21	C3	OL
Torque Valve Closing	By Application	Section 8/ Page 22	tC	% Rated
Torque Valve Opening	Boost / Motor Stall	Section 8/ Page 23	tO	bb
Close Limit	By Application	Section 8/ Page 24	LC	
Open Limit	By Application	Section 8/ Page 24	LO	
Indications Settings:				
Indication Contact 1	Make at Full Shut	Section 9.2/ Page 28	R1	CL / no
Indication Contact 2	Make at Full Open	Section 9.2/ Page 28	R2	OP / no
Indication Contact 3	Break at Full Shut	Section 9.2/ Page 28	R3	CL / nc
Indication Contact 4	Break at Full Open	Section 9.2/ Page 28	R4	OP / nc
Control Mode Settings:				
ESD Enabled	Enabled	Section 9.3/ Page 29	A1	on
ESD Action	Open	Section 9.3/ Page 29	A2	OP
ESD Contact Type	ESD on Applied Signal	Section 9.3/ Page 29	A3	no
ESD Bypass Thermostat	Bypass Enabled	Section 9.3/ Page 30	A4	on
ESD Override Interlocks	Override On	Setting Not Available		
ESD Override Local Stop	Override On	Setting Not Available		
Maintained Local Controls	Maintained	Section 9.3/ Page 30	A5	on
Two Wire Priority	Close Priority	Section 9.3/ Page 30	A6	OF
			A7	OF
External Interlocks	Enabled	Section 9.3/ Page 31	A8	on
Display Invert	Disabled	Section 9.3/ Page 31	A9	OF
Torque Switch Bypass	Enabled	Default program setting not available.		
Options:				
Additional Indication Contacts	None			
CPT (Position Transmitter)	None	Section 9.8/ Page 38	OI	OF
Folomatic (Positioner)	None	Section 9.4/ Page 32	OF	OF
Remote Control Source	None			
Bus System Interface	None	Section 9.5/ Page 35	OP	OF
Interrupter Timer	None	Section 9.6/ Page 39	OJ	OF
Setting Tool – Local Control	Disabled	Section 9.7/ Page 41	Or	OF
Power Loss Inhibit.	Disabled	Section 9.9/ Page 42	OS	OF

RECOMMENDED HOOKUP FOR IQ WIRING DIAGRAM WD18394
FOR ESP (EMERGENCY SHUT-DOWN PROCEDURES) FOR
FEED WATER STOP AND RAPID DRAIN VALVES WHEN CONFIGURED TO
ROTORK DOCUMENT DOC1572.

CIRCUIT DIAGRAM No
WS18395-02



ESP OPERATION WHEN CONFIGURED TO DOC1572

FEED WATER STOP VALVE: RUN FULL CLOSED
RAPID DRAIN VALVE : RUN FULL OPEN

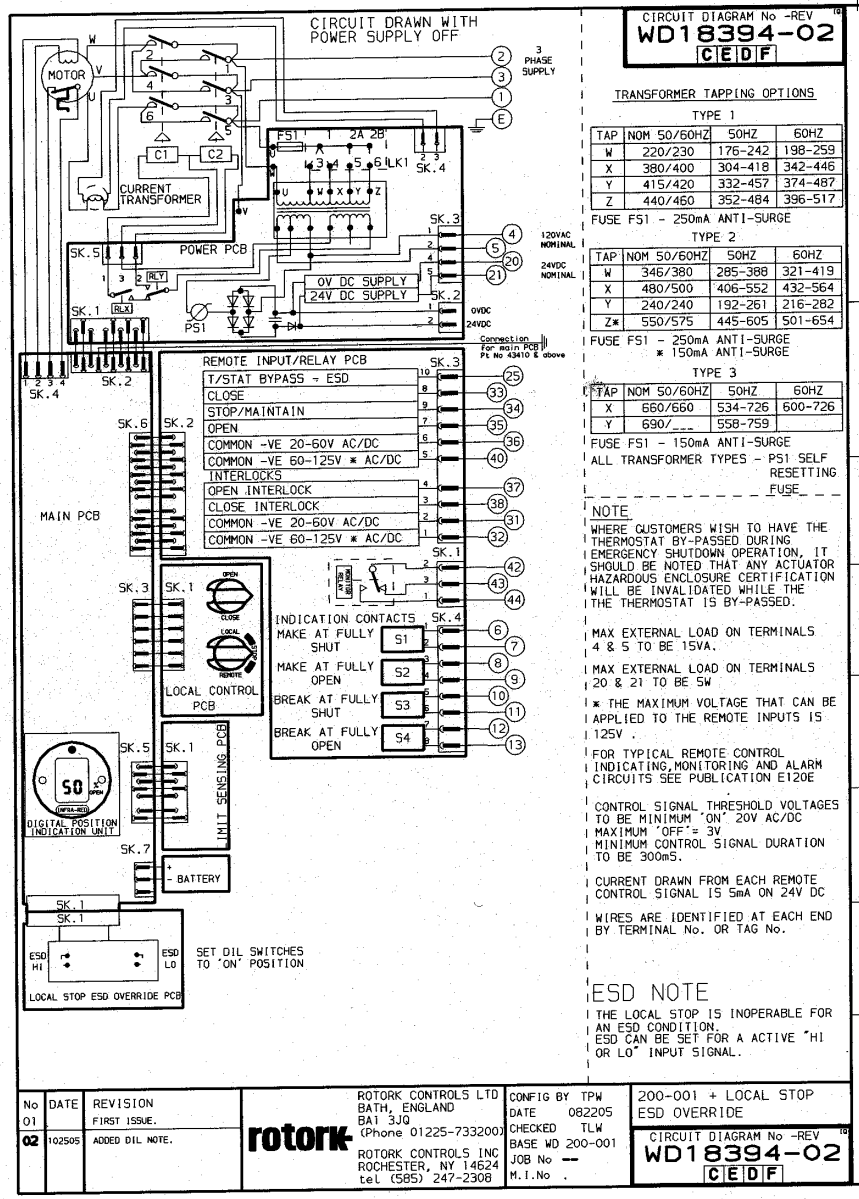
BYPASS MOTOR THERMOSTAT
BYPASS LOCAL OPEN
BYPASS LOCAL CLOSE
BYPASS REMOTE OPEN
BYPASS REMOTE STOP
BYPASS REMOTE CLOSE
BYPASS LOCAL STOP
* DOES NOT BYPASS INTERLOCKS

No	DATE	REVISION	No	DATE	REVISION
01	8/05	FIRST ISSUE			
02	090205	MODIFIED TITLE.			

DRAWN TPW DATE 08/22/05 | CHECKED CW DATE 08/22/05 | WD18394 ESP HOOKUP PER DOC1572

rotork ROTORK CONTROLS BATH UK. BA1 3JQ. tel(0225)28451. ROCHESTER, NY 14624 tel(716)328-1550

CIRCUIT DIAGRAM Z
WS18395-02



CIRCUIT DIAGRAM No -REV
WD18394-02
C E D F

TRANSFORMER TAPPING OPTIONS

TYPE 1

TAP	NOM 50/60HZ	50HZ	60HZ
W	220/230	176-242	198-259
X	380/400	304-418	342-446
Y	415/420	332-457	374-487
Z	440/460	352-484	396-517

FUSE FS1 - 250mA ANTI-SURGE

TYPE 2

TAP	NOM 50/60HZ	50HZ	60HZ
W	346/380	285-388	321-419
X	480/500	406-552	432-564
Y	240/240	192-261	216-282
Z*	550/575	445-605	501-654

FUSE FS1 - 250mA ANTI-SURGE
* 150mA ANTI-SURGE

TYPE 3

TAP	NOM 50/60HZ	50HZ	60HZ
X	660/660	534-726	600-726
Y	690/___	558-759	

FUSE FS1 - 150mA ANTI-SURGE
ALL TRANSFORMER TYPES - PS1 SELF RESETTING FUSE

NOTE

WHERE CUSTOMERS WISH TO HAVE THE THERMOSTAT BY-PASSED DURING EMERGENCY SHUTDOWN OPERATION, IT SHOULD BE NOTED THAT ANY ACTUATOR HAZARDOUS ENCLOSURE CERTIFICATION WILL BE INVALIDATED WHILE THE THE THERMOSTAT IS BY-PASSED.

MAX EXTERNAL LOAD ON TERMINALS 4 & 5 TO BE 15VA.

MAX EXTERNAL LOAD ON TERMINALS 20 & 21 TO BE 5W

* THE MAXIMUM VOLTAGE THAT CAN BE APPLIED TO THE REMOTE INPUTS IS 125V .

FOR TYPICAL REMOTE CONTROL INDICATING,MONITORING AND ALARM CIRCUITS SEE PUBLICATION E120E

CONTROL SIGNAL THRESHOLD VOLTAGES TO BE MINIMUM 'ON' 20V AC/DC
MAXIMUM 'OFF' = 3V
MINIMUM CONTROL SIGNAL DURATION TO BE 300mS.

CURRENT DRAWN FROM EACH REMOTE CONTROL SIGNAL IS 5mA ON 24V DC

WIRES ARE IDENTIFIED AT EACH END BY TERMINAL No. OR TAG No.

ESD NOTE

THE LOCAL STOP IS INOPERABLE FOR AN ESD CONDITION.
ESD CAN BE SET FOR A ACTIVE 'HI OR LO' INPUT SIGNAL.

No	DATE	REVISION
01		FIRST ISSUE.
02	102505	ADDED DIL NOTE.

rotork

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ROTORK CONTROLS INC
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tel (585) 247-2308

CONFIG BY TPW
DATE 082205
CHECKED TLW
BASE WD 200-001
JOB No --
M.I.No .

200-001 + LOCAL STOP ESD OVERRIDE

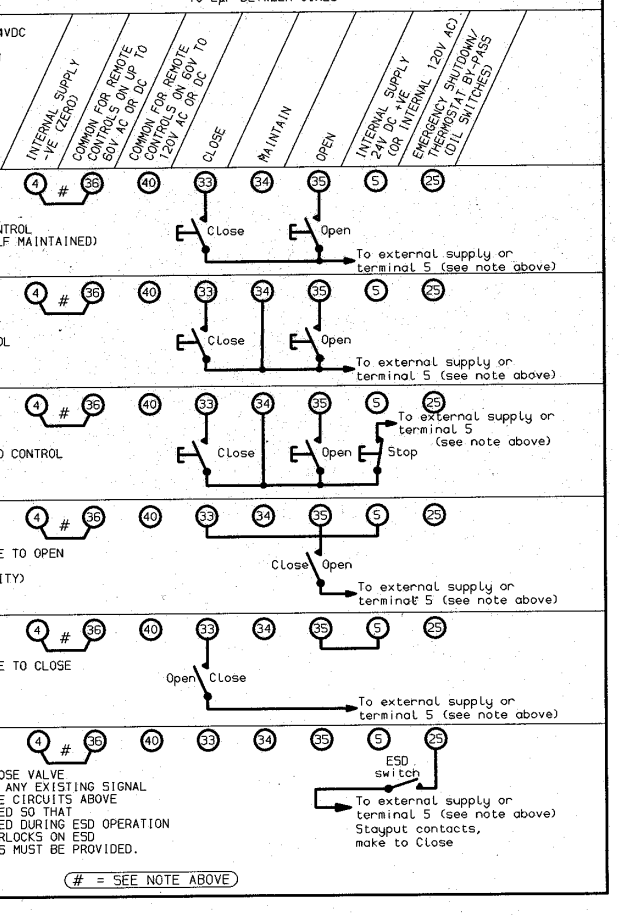
CIRCUIT DIAGRAM No -REV
WD18394-02
C E D F

REMOTE CONTROL CIRCUITS

THE INFRA RED SETTING TOOL ENABLES VARIOUS DIFFERENT REMOTE CONTROLS TO BE CONFIGURED. UNLESS SPECIFIED REQUIREMENTS ARE STATED WITH THE ORDER ACTUATORS WILL BE SUPPLIED CONFIGURED AS FOLLOWS:-
MAINTAINED LOCAL CONTROL
CLOCKWISE TO CLOSE
THERMOSTAT BY-PASSED ON ESD
OPEN AND CLOSED INTERLOCKS DISABLED
CLOSE SIGNAL PRIORITY
INTERRUPTOR TIMER DISABLED
THE TYPICAL REMOTE CONTROL CIRCUITS SHOWN BELOW APPLY TO THESE UNLESS OTHERWISE STATED

REMOTE CONTROLS MAY BE FED INTERNALLY IN THE FOLLOWING WAYS:-
i) FROM THE 24VDC SUPPLY AT TERMINAL 5 WHEN TERMINALS 4-36 MUST BE LINKED.
ii) FROM THE 120VAC SUPPLY AT TERMINAL 5 WHEN TERMINALS 4-40 MUST BE LINKED.
REMOTE CONTROLS MAY BE FED FROM AN EXTERNAL SUPPLY WHEN THE ZERO/-VE OF THE SUPPLY SHOULD BE CONNECTED AS FOLLOWS:-
TO TERMINAL 36 FOR UP TO 60V AC OR DC.
TO TERMINAL 40 FOR 60V TO 120V AC OR DC.
TERMINALS 4-36 ALSO TO BE LINKED FOR FORM D, E, AND F CONTROL.
THE INPUT TO THE IQ SERIES ACTUATOR LOGIC CIRCUITS ASSOCIATED WITH THE REMOTE CONTROLS MAY BE USED WITH CABLE CAPACITANCE OF UP TO 2μF BETWEEN CORES

MAX. EXTERNAL LOAD ON 24VDC SUPPLY FROM ACTUATOR TERMINALS 4 - 5 TO BE 5W



Feed Water Stop Valve Settings - IQmk2

Wiring Diagram: 3000-001	Hookup Drawing: WS18333

Recommended Settings:		Operating Manual E170E2 Section/Page	Screen	Setting
Primary Settings:				
Direction To Close	Clock	Section 8/ Page 22	C1	C
Close Action	Torque	Section 8/ Page 23	C2	Ct
Open Action	Limit	Section 8/ Page 24	C3	OL
Torque Valve Closing	By Application	Section 8/ Page 25	tC	% Rated
Torque Valve Opening	75% Rated Torque	Section 8/ Page 26	tO	75
Close Limit	By Application	Section 8/ Page 27	LC	
Open Limit	By Application	Section 8/ Page 27	LO	
Indications Settings:				
Indication Contact 1	Make at Full Shut	Section 9.2/ Page 32,33	R1	CL / no
Indication Contact 2	Make at Full Open	Section 9.2/ Page 32,33	R2	OP / no
Indication Contact 3	Break at Full Shut	Section 9.2/ Page 32,33	R3	CL / nc
Indication Contact 4	Break at Full Open	Section 9.2/ Page 32,33	R4	OP / nc
Control Mode Settings:				
ESD Enabled	Enabled			
ESD Action	Close	Section 9.3/ Page 34	A1	CL
ESD Contact Type	ESD on Applied Signal	Section 9.3/ Page 34	A2	no
ESD Bypass Thermostat	Bypass Enabled	Section 9.3/ Page 34 and Appendix 1	A3	on
ESD Override Interlocks	Override On	Section 9.3/ Page 35	A4	on
ESD Override Local Stop	Override On	Section 9.3/ Page 35	A5	on
Maintained Local Controls	Maintained	Section 9.3/ Page 35	A6	on
Two Wire Priority	Close Priority	Section 9.3/ Page 35	A7	CL
External Interlocks	Enabled	Section 9.3/ Page 36	A8	on
Display Invert	Disabled	Display can be physically inverted.		
Conditional Control	Disabled	Section 9.3/ Page 36	A9	OF
Torque Switch Bypass Unseating	Enabled	Section 9.3/ Page 36	At	on
Options:				
Additional Indication Contacts	None	Section 9.4/ Page 37	OE	OF
CPT (Position Transmitter)	None	Section 9.5/ Page 38	OI	OF
Folomatic (Positioner)	None	Section 9.6/ Page 39	OF	OF
Remote Control Source	None	Section 9.7/ Page 42	Od	rE
Bus System Interface	None	Section 9.8/ Page 43	OP	OF
Interrupter Timer	None	Section 9.13/ Page 60	OJ	OF
Setting Tool – Local Control	Disabled	Section 9.14/ Page 62	Or	OF
Power Loss Inhibit.	Disabled	Section 9.15/ Page 62	OS	OF

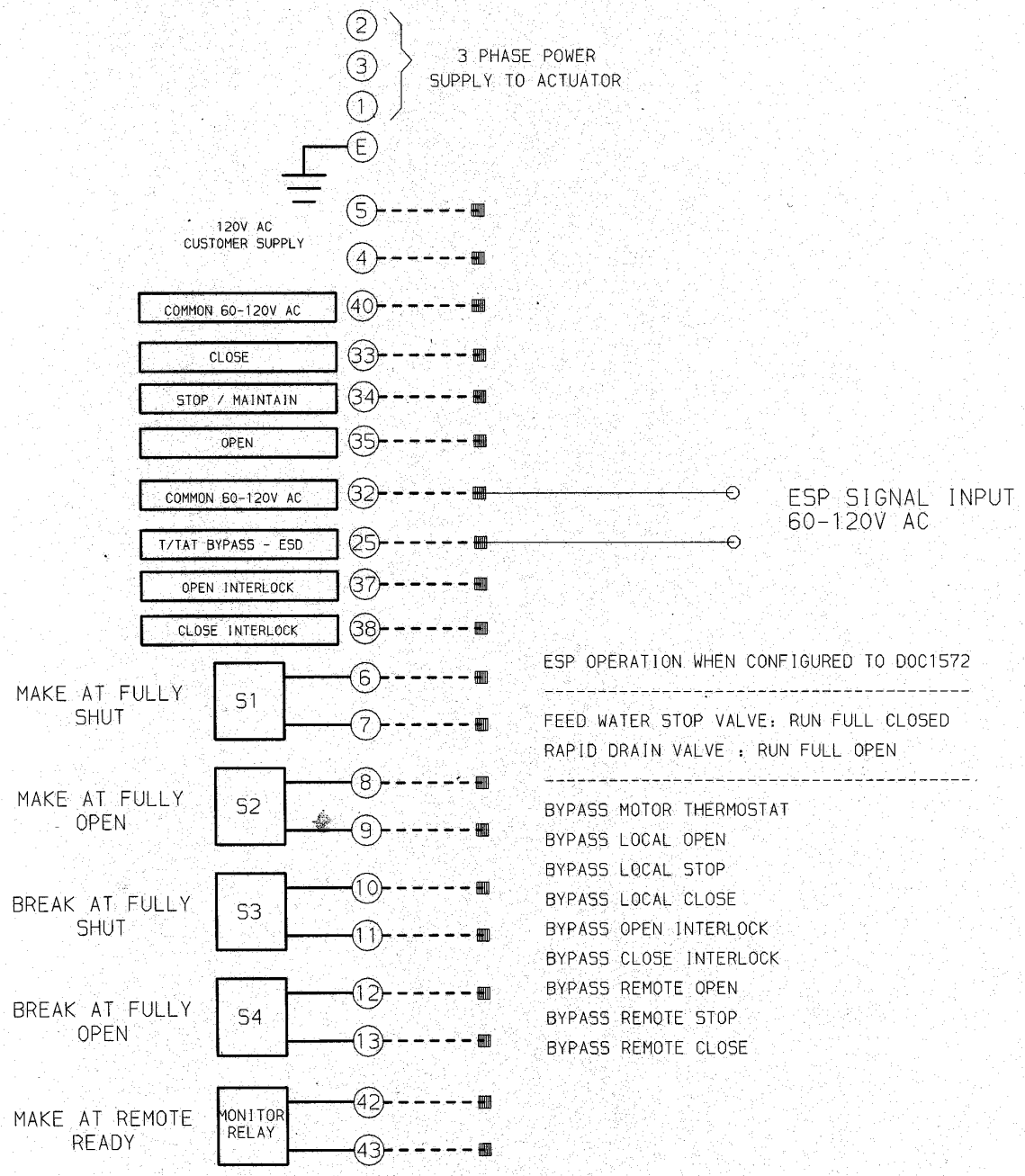
Rapid Drain Valve Settings - IQmk2

Wiring Diagram: 3000-001	Hookup Drawing: WS18333

Recommended Settings:		Operating Manual E170E2 Section/Page	Screen	Setting
Primary Settings:				
Direction To Close	Clock	Section 8/ Page 22	C1	C
Close Action	Torque	Section 8/ Page 23	C2	Ct
Open Action	Limit	Section 8/ Page 24	C3	OL
Torque Valve Closing	By Application	Section 8/ Page 25	tC	% Rated
Torque Valve Opening	Boost / Motor Stall	Section 8/ Page 26	tO	bb
Close Limit	By Application	Section 8/ Page 27	LC	
Open Limit	By Application	Section 8/ Page 27	LO	
Indications Settings:				
Indication Contact 1	Make at Full Shut	Section 9.2/ Page 32,33	R1	CL / no
Indication Contact 2	Make at Full Open	Section 9.2/ Page 32,33	R2	OP / no
Indication Contact 3	Break at Full Shut	Section 9.2/ Page 32,33	R3	CL / nc
Indication Contact 4	Break at Full Open	Section 9.2/ Page 32,33	R4	OP / nc
Control Mode Settings:				
ESD Enabled	Enabled			
ESD Action	Open	Section 9.3/ Page 34	A1	OP
ESD Contact Type	ESD on Applied Signal	Section 9.3/ Page 34	A2	no
ESD Bypass Thermostat	Bypass Enabled	Section 9.3/ Page 34 and Appendix 1	A3	on
ESD Override Interlocks	Override On	Section 9.3/ Page 35	A4	on
ESD Override Local Stop	Override On	Section 9.3/ Page 35	A5	on
Maintained Local Controls	Maintained	Section 9.3/ Page 35	A6	on
Two Wire Priority	Close Priority	Section 9.3/ Page 35	A7	CL
External Interlocks	Enabled	Section 9.3/ Page 36	A8	on
Display Invert	Disabled	Display can be physically inverted.		
Conditional Control	Disabled	Section 9.3/ Page 36	A9	OF
Torque Switch Bypass Unseating	Enabled	Section 9.3/ Page 36	At	on
Options:				
Additional Indication Contacts	None	Section 9.4/ Page 37	OE	OF
CPT (Position Transmitter)	None	Section 9.5/ Page 38	OI	OF
Folomatic (Positioner)	None	Section 9.6/ Page 39	OF	OF
Remote Control Source	None	Section 9.7/ Page 42	Od	rE
Bus System Interface	None	Section 9.8/ Page 43	OP	OF
Interrupter Timer	None	Section 9.13/ Page 60	OJ	OF
Setting Tool – Local Control	Disabled	Section 9.14/ Page 62	Or	OF
Power Loss Inhibit.	Disabled	Section 9.15/ Page 62	OS	OF

RECOMMENDED HOOKUP FOR IQMK2 WIRING DIAGRAM 3000-001
FOR ESP (EMERGENCY SHUT-DOWN PROCEDURES) FOR
FEED WATER STOP AND RAPID DRAIN VALVES WHEN CONFIGURED TO
ROTORK DOCUMENT DOC1572.

CIRCUIT DIAGRAM No
WS18333-02



ESP OPERATION WHEN CONFIGURED TO DOC1572

FEED WATER STOP VALVE: RUN FULL CLOSED
RAPID DRAIN VALVE : RUN FULL OPEN

BYPASS MOTOR THERMOSTAT
BYPASS LOCAL OPEN
BYPASS LOCAL STOP
BYPASS LOCAL CLOSE
BYPASS OPEN INTERLOCK
BYPASS CLOSE INTERLOCK
BYPASS REMOTE OPEN
BYPASS REMOTE STOP
BYPASS REMOTE CLOSE

No	DATE	REVISION
01	6/05	FIRST ISSUE
02	090205	MODIFIED TITLE.

No	DATE	REVISION

DRAWN TPW DATE 06/02/05
CHECKED CW DATE 06/02/05

3000-001 ESP HOOKUP PER DOC1572

rotork

ROTORK CONTROLS
BATH UK. BA1 3JQ.
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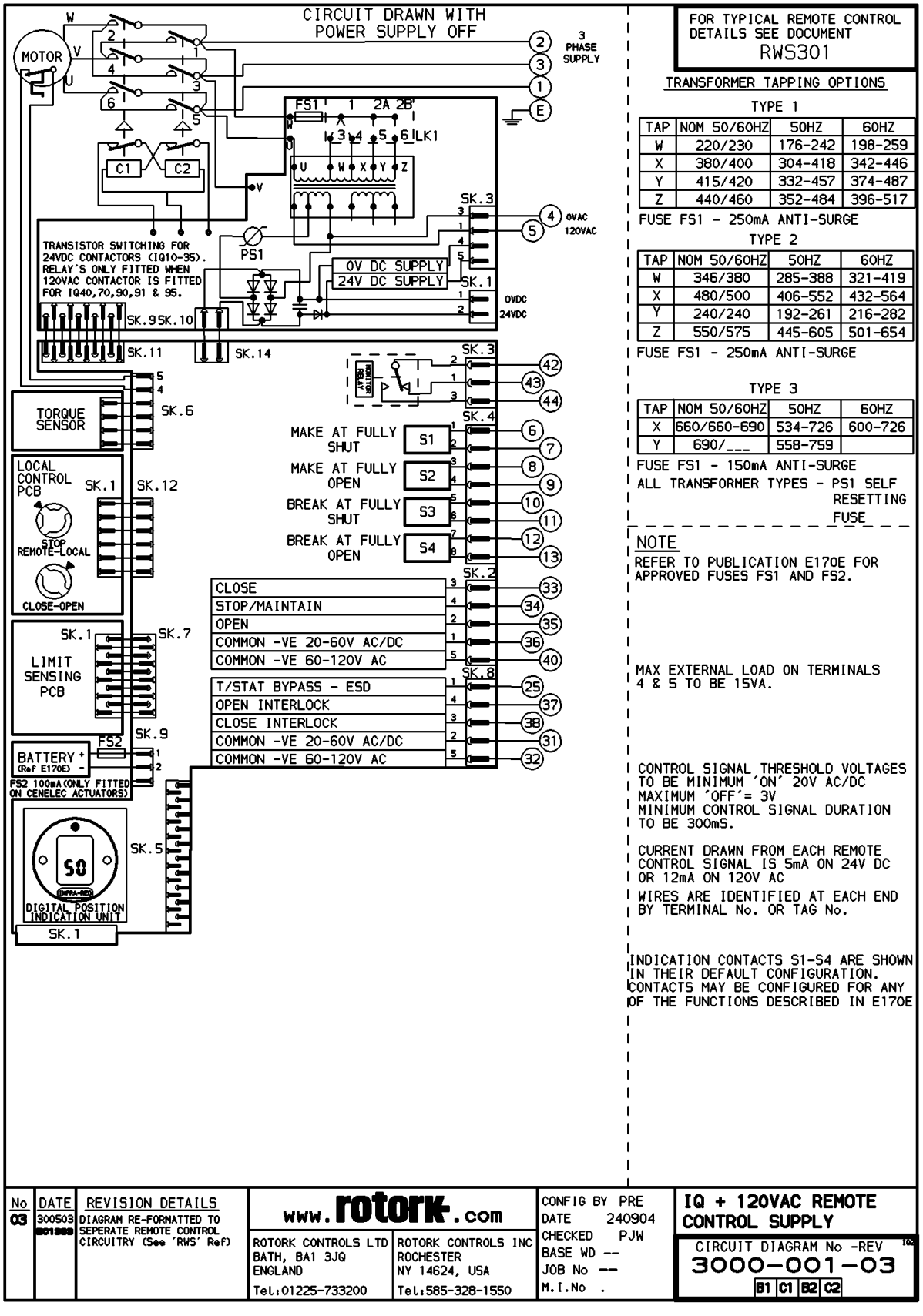
ROCHESTER, NY
14624
tel(716)328-1550

CIRCUIT DIAGRAM Z
WS18333-02



FOR TYPICAL REMOTE CONTROL DETAILS SEE DOCUMENT
RWS301

TRANSFORMER TAPPING OPTIONS

TYPE 1

TAP	NOM 50/60HZ	50HZ	60HZ
W	220/230	176-242	198-259
X	380/400	304-418	342-446
Y	415/420	332-457	374-487
Z	440/460	352-484	396-517

FUSE FS1 - 250mA ANTI-SURGE

TYPE 2

TAP	NOM 50/60HZ	50HZ	60HZ
W	346/380	285-388	321-419
X	480/500	406-552	432-564
Y	240/240	192-261	216-282
Z	550/575	445-605	501-654

FUSE FS1 - 250mA ANTI-SURGE

TYPE 3

TAP	NOM 50/60HZ	50HZ	60HZ
X	660/660-690	534-726	600-726
Y	690/___	558-759	

FUSE FS1 - 150mA ANTI-SURGE

ALL TRANSFORMER TYPES - PS1 SELF RESETTING FUSE

NOTE

REFER TO PUBLICATION E170E FOR APPROVED FUSES FS1 AND FS2.

MAX EXTERNAL LOAD ON TERMINALS 4 & 5 TO BE 15VA.

CONTROL SIGNAL THRESHOLD VOLTAGES TO BE MINIMUM 'ON' 20V AC/DC
MAXIMUM 'OFF'= 3V
MINIMUM CONTROL SIGNAL DURATION TO BE 300mS.

CURRENT DRAWN FROM EACH REMOTE CONTROL SIGNAL IS 5mA ON 24V DC OR 12mA ON 120V AC

WIRES ARE IDENTIFIED AT EACH END BY TERMINAL No. OR TAG No.

INDICATION CONTACTS S1-S4 ARE SHOWN IN THEIR DEFAULT CONFIGURATION. CONTACTS MAY BE CONFIGURED FOR ANY OF THE FUNCTIONS DESCRIBED IN E170E

No	DATE	REVISION DETAILS
03	300503	DIAGRAM RE-FORMATTED TO SEPERATE REMOTE CONTROL CIRCUITRY (See 'RWS' Ref)

www.rotork.com

ROTORK CONTROLS LTD
BATH, BA1 3JQ
ENGLAND
Tel:01225-733200

ROTORK CONTROLS INC
ROCHESTER
NY 14624, USA
Tel:585-328-1550

CONFIG BY PRE
DATE 240904
CHECKED PJW
BASE WD --
JOB No --
M.I.No .

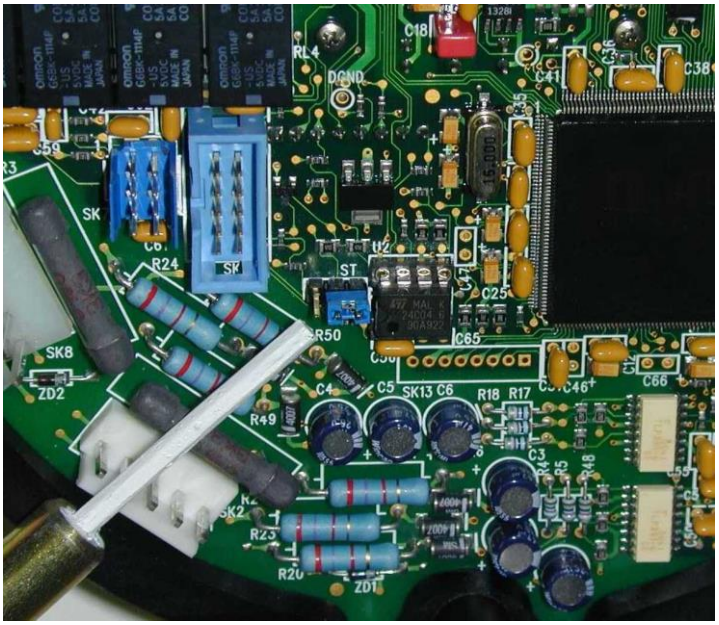
IQ + 120VAC REMOTE CONTROL SUPPLY

CIRCUIT DIAGRAM No -REV
3000-001-03
B1 C1 B2 C2

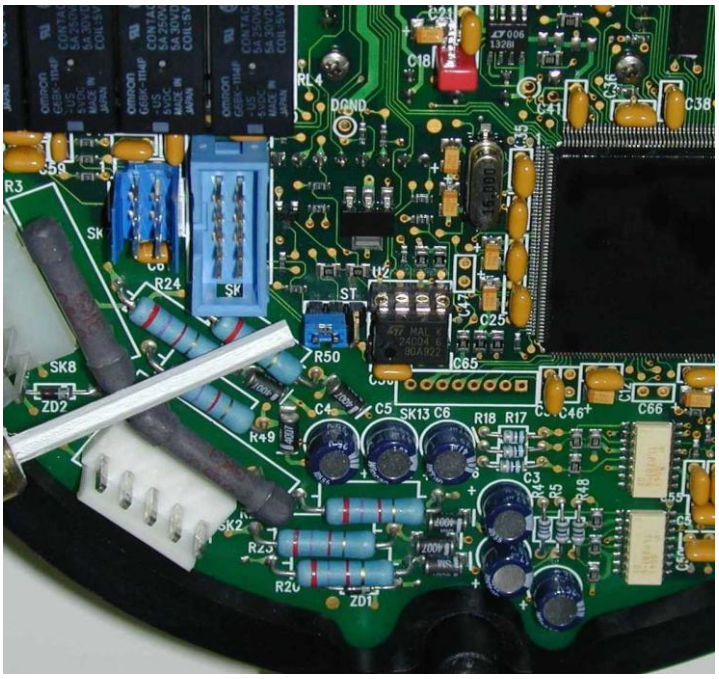
Appendix 1 ESD Bypass Thermostat IQ MK 2 Product

If this function is to be DISABLED, then using Anti-Static precautions, move the link to the position furthest away from the EEPROM - so that the middle and end pins are linked - see photograph "TBPESD OFF"

PHOTOGRAPH "ST POS"



PHOTOGRAPH "TBPESD OFF"



Feed Water Stop Valve Settings – IQmk3

Wiring Diagram: 110B0000	Hookup Drawing: WS22686

Recommended Settings:		Operating Manual PUB002-040 Section/Page	Settings Menu	Setting
Primary Settings:				
Direction To Close	Clock	Section 2.1 (part 1 of 12) Page 8	Limits / Close Settings	Clock
Close Action	Torque	Section 2.1 (part 2 of 12) Page 8	Limits / Close Settings	Torque
Open Action	Limit	Section 2.1 (part 5 of 12) Page 9	Limits / Open Settings	Limit
Torque Valve Closing	By Application	See below Page 33	Limits / Close Settings	Max % rated
Torque Valve Opening	75% Rated Torque	Section 2.1 (part 6 of 12) Page 9	Limits / Open Settings	75
Torque Switch Bypass Unseating	Enabled	Section 2.1 (part 9 of 12) Page 10	Limits / Open Settings	On
Torque Switch Bypass Unseating	Percentage of travel	Section 2.1 (part 10 of 12) Page 10	Limits / Open Settings	5%
Close Limit	By Application	Section 2.1 (part 4 of 12) Page 9	Limits / Close Settings	
Open Limit	By Application	Section 2.1 (part 7 of 12) Page 10	Limits / Open Settings	
Indications Settings:				
Indication Contact 1	Make at Full Shut	Section 2.2 (part 1 of 7) Page 11	Indication / Contacts	CL / no
Indication Contact 2	Make at Full Open	Section 2.2 (part 1 of 7) Page 11	Indication / Contacts	OP / no
Indication Contact 3	Break at Full Shut	Section 2.2 (part 1 of 7) Page 11	Indication / Contacts	CL / nc
Indication Contact 4	Break at Full Open	Section 2.2 (part 1 of 7) Page 11	Indication / Contacts	OP / nc
Control Mode Settings:				
ESD Enabled	Enabled	Section 2.4 (part 3 of 7) Page 11	ESD / Net Disable	Off
ESD Action	Close	Section 2.4 (part 1 of 7) Page 11	ESD / Direction	Close
ESD Contact Type	ESD on Applied Signal	Section 2.4 (part 2 of 7) Page 11	ESD / ESD when	Applied
ESD Bypass Thermostat	Bypass Enabled	Section 2.4 (part 7 of 7) Page 11	ESD / Thermostat	Yes
ESD Override Interlocks	Override On	Section 2.4 (part 5 of 7) Page 11	ESD / Interlocks	Yes
ESD Override Local Stop	Override On	Section 2.4 (part 4 of 7) Page 11	ESD / Stop	Yes
Maintained Local Controls	Override On	Section 2.3.1 (part 3 of 5) Page 15	Control / Remote / Maintained	Yes
Two Wire Priority	Close Priority	Section 2.3.2-1 (part 1 of 2) Page 17	Control / Remote / Hardwired / 2-Wire Priority	Close
External Interlocks	Enabled	Section 2.3.2-1 (part 1 of 2) Page 17	Control / Remote / Hardwired / Interlocks	Enabled
Display Invert	Disabled	Display can be physically inverted.		
Options:				
Additional Indication Contacts	None	Section 2.2 (part 1 of 7) Page 11	Indication / Contacts	-----
CPT (Position Transmitter)	None	Section 2.3 Page 14	Indication / Analogue	OFF
Folomatic (Positioner)	None	Section 2.3.2 Page 16	Control / Remote / Analogue	-----
Remote Control Source	None	Section 2.3.2 Page 16	Control / Remote / Hardwired	ON
Bus System Interface	None	Section 2.3.2 Page 16	Control / Remote / *Network*	-----
Interrupter Timer	None	Section 2.3.3 Page 31	Control / Interrupter Timer	-----
Setting Tool – Local Control	Disabled	Section 2.3.1 (part 2 of 5) Page 15	Control / Local	No

Rapid Drain Valve Settings – IQmk3

Wiring Diagram: 110B0000	Hookup Drawing: WS22686

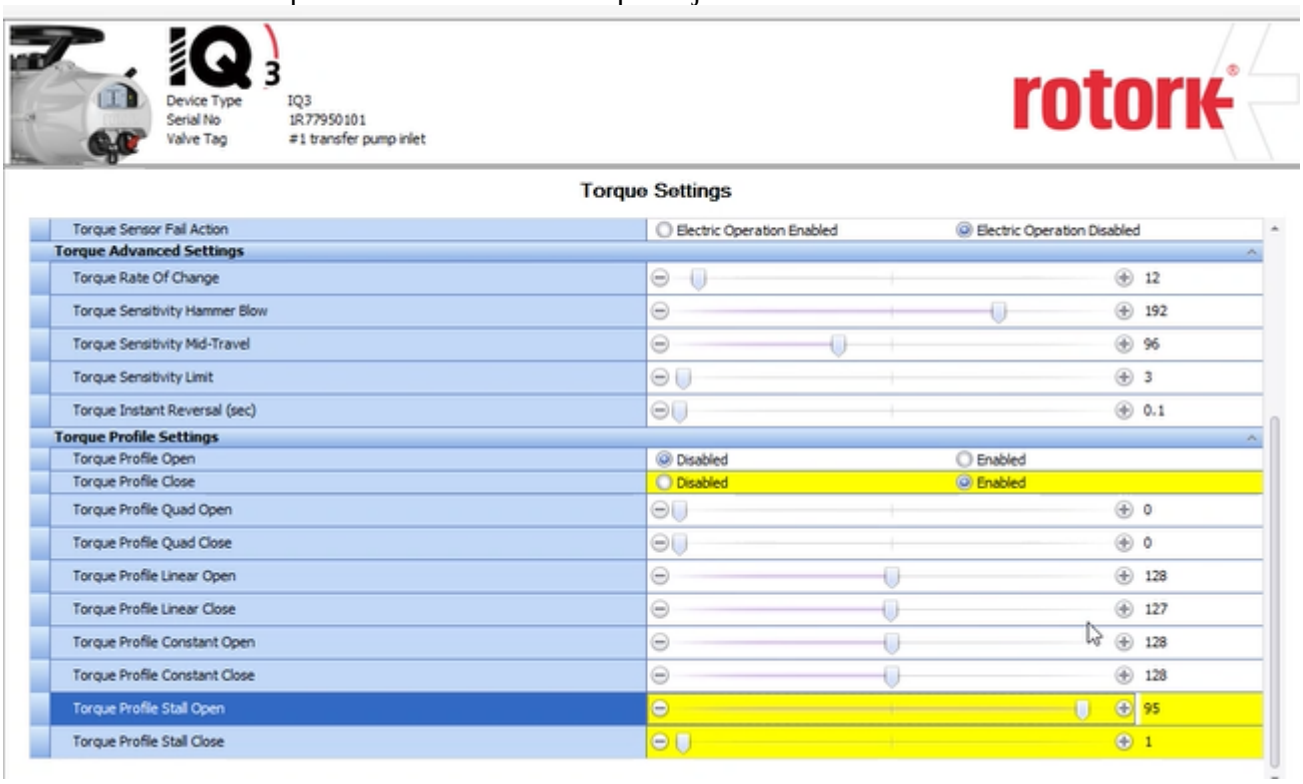
Recommended Settings:		Operating Manual E170E2 Section/Page	Settings Menu	Setting
Primary Settings:				
Direction To Close	Clock	Section 2.1 (part 1of 12) Page 8	Limits / Close Settings	Clock
Close Action	Torque	Section 2.1 (part 2of 12) Page 8	Limits / Close Settings	Torque
Open Action	Limit	Section 2.1 (part 5of 12) Page 9	Limits / Open Settings	Limit
Torque Valve Closing	By Application	Section 2.1 (part 3of 12) Page 9	Limits / Close Settings	% Rated
Torque Valve Opening	Max Stall Torque	See below Page 33	Limits / Open Settings	Stall Torque
Torque Switch Bypass Unseating	Enabled	Section 2.1 (part 7of 12) Page 10	Limits / Open Settings	On
Torque Switch Bypass Unseating	Percentage of travel	Section 2.1 (part 10 of 12) Page 10	Limits / Open Settings	95%
Close Limit	By Application	Section 2.1 (part 4of 12) Page 9	Limits / Close Settings	
Open Limit	By Application	Section 2.1 (part 7of 12) Page 10	Limits / Open Settings	
Indications Settings:				
Indication Contact 1	Make at Full Shut	Section 2.2 (part 1 of 7) Page 11	Indication / Contacts	CL / no
Indication Contact 2	Make at Full Open	Section 2.2 (part 1 of 7) Page 11	Indication / Contacts	OP / no
Indication Contact 3	Break at Full Shut	Section 2.2 (part 1 of 7) Page 11	Indication / Contacts	CL / nc
Indication Contact 4	Break at Full Open	Section 2.2 (part 1 of 7) Page 11	Indication / Contacts	OP / nc
Control Mode Settings:				
ESD Enabled	Enabled	Section 2.4 (part 3 of 7) Page 11	ESD / Net Disable	Off
ESD Action	Close	Section 2.4 (part 1 of 7) Page 11	ESD / Direction	Open
ESD Contact Type	ESD on Applied Signal	Section 2.4 (part 2 of 7) Page 11	ESD / ESD when	Applied
ESD Bypass Thermostat	Bypass Enabled	Section 2.4 (part 7 of 7) Page 11	ESD / Thermostat	Yes
ESD Override Interlocks	Override On	Section 2.4 (part 5 of 7) Page 11	ESD / Interlocks	Yes
ESD Override Local Stop	Override On	Section 2.4 (part 4 of 7) Page 11	ESD / Stop	Yes
Maintained Local Controls	Override On	Section 2.3.1 (part 3 of 5) Page 15	Control / Remote / Maintained	Yes
Two Wire Priority	Close Priority	Section 2.3.2-1 (part 1 of 2) Page 17	Control / Remote / Hardwired / 2-Wire Priority	Close
External Interlocks	Enabled	Section 2.3.2-1 (part 1 of 2) Page 17	Control / Remote / Hardwired / Interlocks	Enabled
Display Invert	Disabled	Display can be physically inverted.		
ESD Enabled	Enabled	Section 2.4 (part 3 of 7) Page 11	ESD / Net Disable	Off
Options:				
Additional Indication Contacts	None	Section 2.2 (part 1 of 7) Page 11	Indication / Contacts	-----
CPT (Position Transmitter)	None	Section 2.3 Page 14	Indication / Analogue	OFF
Folomatic (Positioner)	None	Section 2.3.2 Page 16	Control / Remote / Analogue	-----
Remote Control Source	None	Section 2.3.2 Page 16	Control / Remote / Hardwired	ON
Bus System Interface	None	Section 2.3.2 Page 16	Control / Remote / *Network*	-----
Interrupter Timer	None	Section 2.3.3 Page 31	Control / Interrupter Timer	-----

Setting Tool – Local Control	Disabled	Section 2.3.1 (part 2 of 5) Page 15	Control / Local	No

Updated 11/3/23

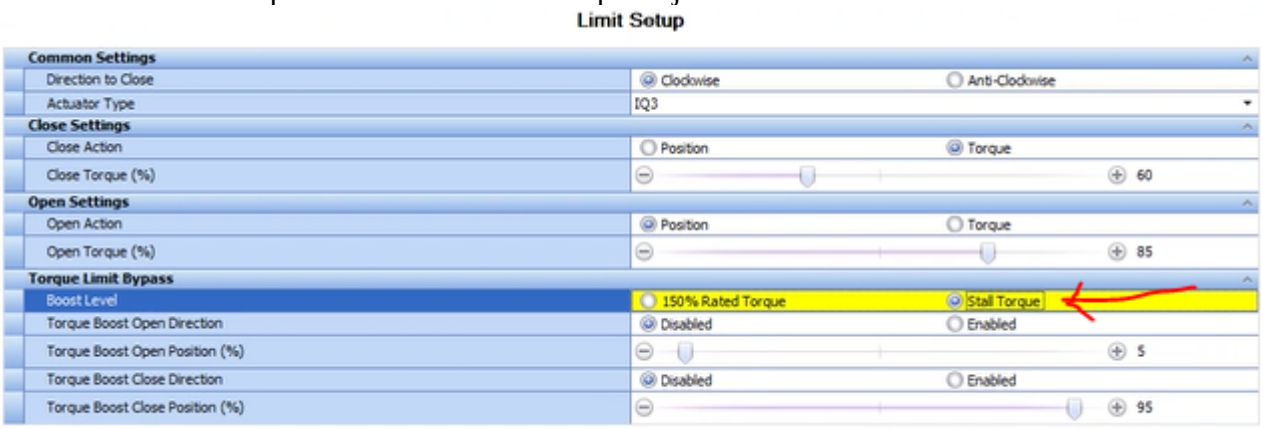
Feed Water Stop Valve Settings – IQmk3

All ESD and normal operation will use stall torque adjusted to 98-99% travel



Rapid Drain Valve Settings – IQmk3

All ESD and normal operation will use stall torque adjusted to 100% travel



Product range IQ 3rd Generation

Subject IQ3 and IQT3 Firmware release notes

IQ3 Control Board firmware (CB)	V123 (STD818V123.stm)
IQ3 UI Board firmware (UIB)	V123 (STD7FC11V123.stm)
IQT3 Motor Control Board (MCB)	V108 (STD840V108.stm)

New Feature additions in this version:

- ESD Override local Control Alarms. When “ESD Override Local Stop” is enabled:
- The ESD will NOT be inhibited by Local Stop (existing feature).
- The ESD will NOT be inhibited by a fault related to the position of the Remote/Stop/Local knob (new Feature).
- The ESD will NOT be inhibited by a fault related to the position of the Open/Close knob (new Feature).

Upgrade Tools

For upgrading the firmware, the following tools are required:

- A copy of Insight 2, version 5.0.21.0 or higher
- The ADF relevant to support the product being upgraded
- A Bluetooth Setting Tool (optional)
- PC / laptop with either a built in Bluetooth adaptor or a plug in Bluetooth dongle. For
- compatible Bluetooth dongles, please view:
https://www.rotork.com/en/documents/publication/16233
- Relevant firmware files, refer to the Knowledge base:
https://rotork.sharepoint.com/sites/RPSKB/SitePages/Default.aspx

Upgrade Methods

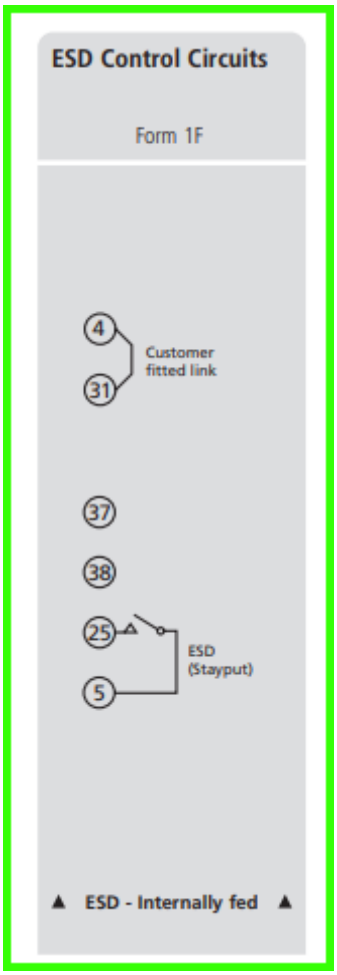
There are 2 methods for upgrading the firmware:

1. Insight 2 Direct Connection Upgrade
2. Loading Missions into a Bluetooth Setting Tool

Both methods require Insight 2 to be installed on a PC / laptop. The latest version and the instructions for installation can be found on the Rotork website:
http://www.rotork.com/en/support/index/downloads

Notes

1. The actuator Bluetooth security will need to be set to an appropriate level to establish a connection. Please refer to specific product Safe Use and Installation Manual for further details.
2. Rotork products Bluetooth range is approx. 10m. Please refer to device manufacturer for laptop / dongle range.


ESD Control Circuits
Form 1F
4
31
Customer
fitted link
37
38
25
5
ESD
(Stayput)
▲ ESD - Internally fed ▲