RPX Door Controller

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RPX B Rack and Pinion Control Panel User's Manual

Manual RPX B V 001.8

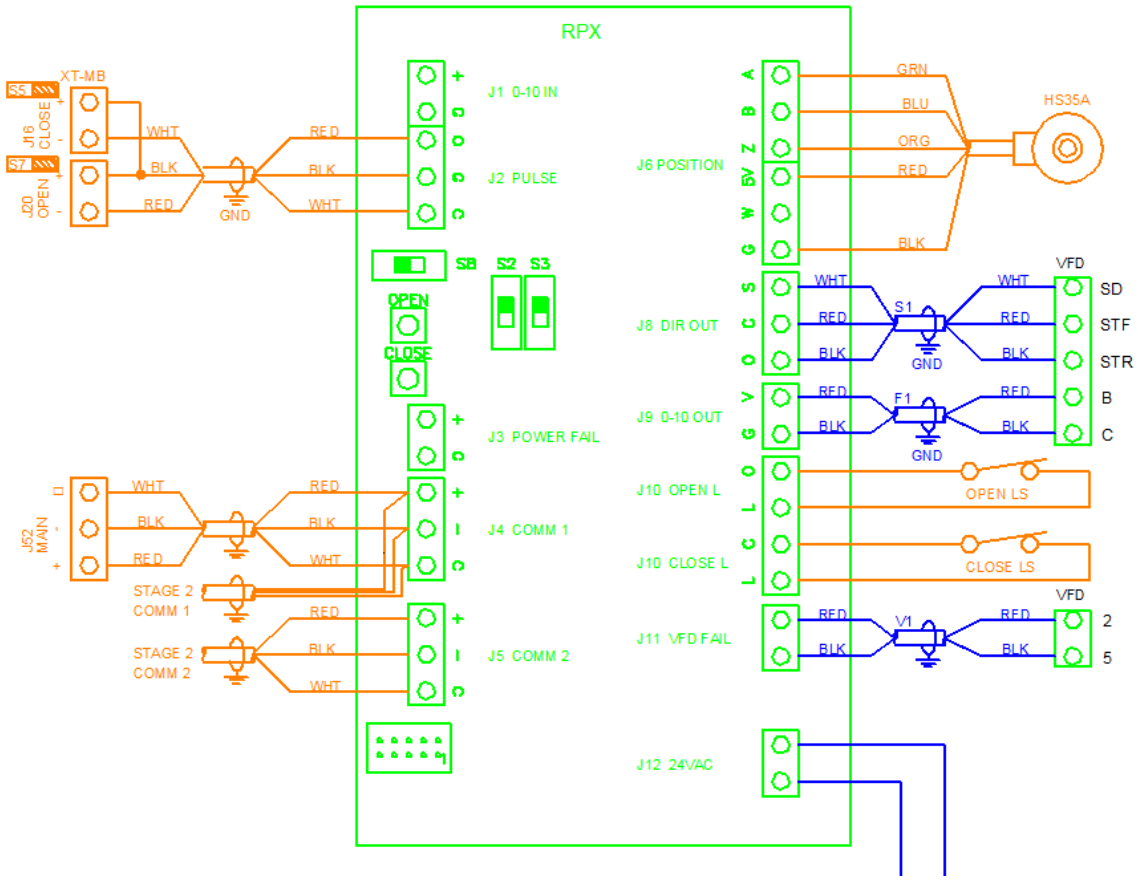
Rack and Pinion Control:

BTU has developed a new type rack and pinion door control. The new rack and pinion control is the first in the industry to address the need for variable speed control. As the demand for tighter and tighter controls increase, the solution becomes one of being able to vary the speed of the individual doors. The door speed can vary depending on the ambient temperature. The doors need to run slower in cold weather and faster in warm weather.

Some of the major issues with the old linear actuator control are the relays that drive the actuators and the dc brushes in the motors. The DC motors have a huge inrush of current at start and slowly destroy the relay contacts. With the new rack and pinion control, there are no relays. The motor control is all solid state.

The RPX card provides all the interface for the limit switches and door position feedback using a pulse wheel. Up to three different stages can be set up to control up to six doors.

TYPICAL WIRING DIAGRAM:



This diagram is for a single stage. The stage has a pulse sensor that keeps track of the exact door position. The board receives open and close pulses from the XT panel on J2. J4 & J5 is used for communications. Forward and Reverse inputs to the drive determine the direction. A 0-10vdc analog output determines the speed and a VFD fault contact is supplied to the card.

The stage can be manually operated using the Auto / Manual switch and open / close push buttons. The manual control is used to set the open and close limits.

The card has a number of LEDS, each pulse input has a green LED for the open limit and a red LED for the close limit. On the input there is a green LED for open pulse and a red LED for the close pulse.

Parameter Explanation

0: Primary Door # This identifies which door from left to right on the outside of the building that this card information will show up on.

1: Secondary Door # This parameter is to identify a second door if using one RPX card to drive two doors..

2: Filter Not used in this application

3: Open Advance % This is the door percentage at which the next stage can start to open.

4: Slow Speed This is the speed of the door when close to the limits. The percentage at which the door will switch from Fast to Slow is the Slow Percentage speed.

5: Fast Speed The fast speed is the door speed. This speed can vary depending on the ambient air temperature and door position. If the door is within slow percentage of either the open or close limit it will go to the Slow Speed.

6: Power Fail Speed This is the speed at which the door will close during a power outage. This speed can be adjusted to accommodate the UPS.

7: Clutch Open Time The time is in 10ms units, (200 = 2 sec). This is a electronic clutch. The encoder produces 1024 pulses per revolution. The clutch open timer looks at the time between pulses which will vary with the selected speed. The lower the setting, the quicker the system will clutch when the door stops moving.

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9: Limit Slow Percentage This is the percentage for either the open or close limit where the door will switch to slow speed. Example - a settting of 10% would set the door to slow speed from 0 to 10% on the close end and 90 to 100% on the open end. A setting of zero will disable the slow speed.

10: Close Advance % This is the door percentage at which the next stage can start to close.

11: Future Position A setting will cause the door to go to that position and then start operating normal. This parameter will then be set to zero.

12: Spare

13: Spare

14: Settlilng Time Speed Speed at which the drive will run for the first 10 minutes of operation.

15: Dynamic Start The dynamic start refers to the drive prepositioning at start determined by previous door position and OSA temperature. This can be turned on and off.

16: Spare

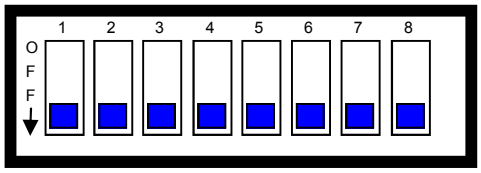
17: Reset Timer If a clutch ratchet is detected, it means the door has stalled and will stop. This stop will cause the next stage to become active. The reset timer is in minutes and will time out if it is in a clutch shut-down. When the timer times out it will reset the alarm and try to restart the door. The resets will continue until the issue is resolved.

18: Time Limit This timer should be set for about 20 seconds more than the time it takes for the door to fully open or close. If the motor runs longer than this timer without hitting a limit switch, a Time Limit Fail cycle will be initiated. This will allow the next stage to be activated. This only becomes active with the loss of the encoder.

400: Total Pulses Set this for the total number of pulses when the door is fully open on the open limit switch.

DIPSWITCHES

The RPX has a set of 8 dip switches. These switches can be used for setting the card number and different types of operation.



Switch 1 (Set open count) Manually run the door from closed to full open. Toggle Sw 1 from OFF to ON to OFF.

Switch 2 (Clutch Bypass) Turn on to bypass the electronic Clutch

Switch 3 (spare)

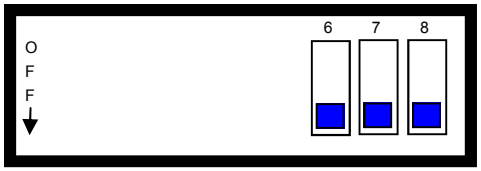
Switch 4 (Close on Power Up) Turn on to force door to close on start up

Switch 5 (spare)
Switch 6 (address)
Switch 7 (address)
Switch 8 (address)

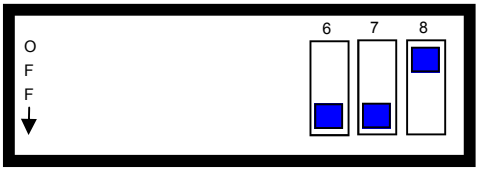
UNIT ADDRESS

Staging - Staging is accomplished by setting the address for each stage. Use either Card 1 or 2 for stage 1. Use either Card 3 or 4 for stage 2. Use either Card 5 or 6 for stage 3.

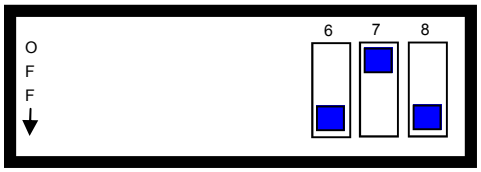
Card # 1 dip switch setting



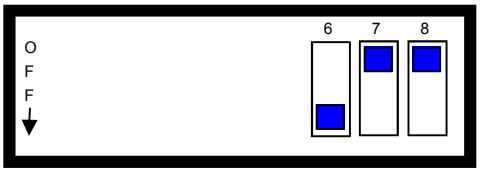
Card # 2 dip switch setting



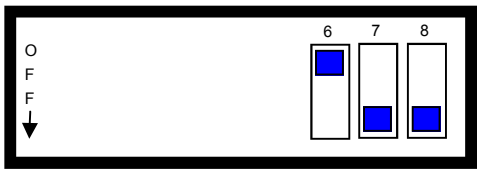
Card # 3 dip switch setting



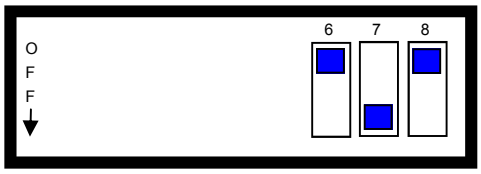
Card # 4 dip switch setting



Card # 5 dip switch setting



Card # 6 dip switch setting



ALARM OPERATION

Power Fail: On power fail a steady close LED will come on and the doors will close at a lower speed (typically 40%) so not to overload the UPS. On an actual power fail, all doors would show up as Fuse on the Java door display and should go to the close position.

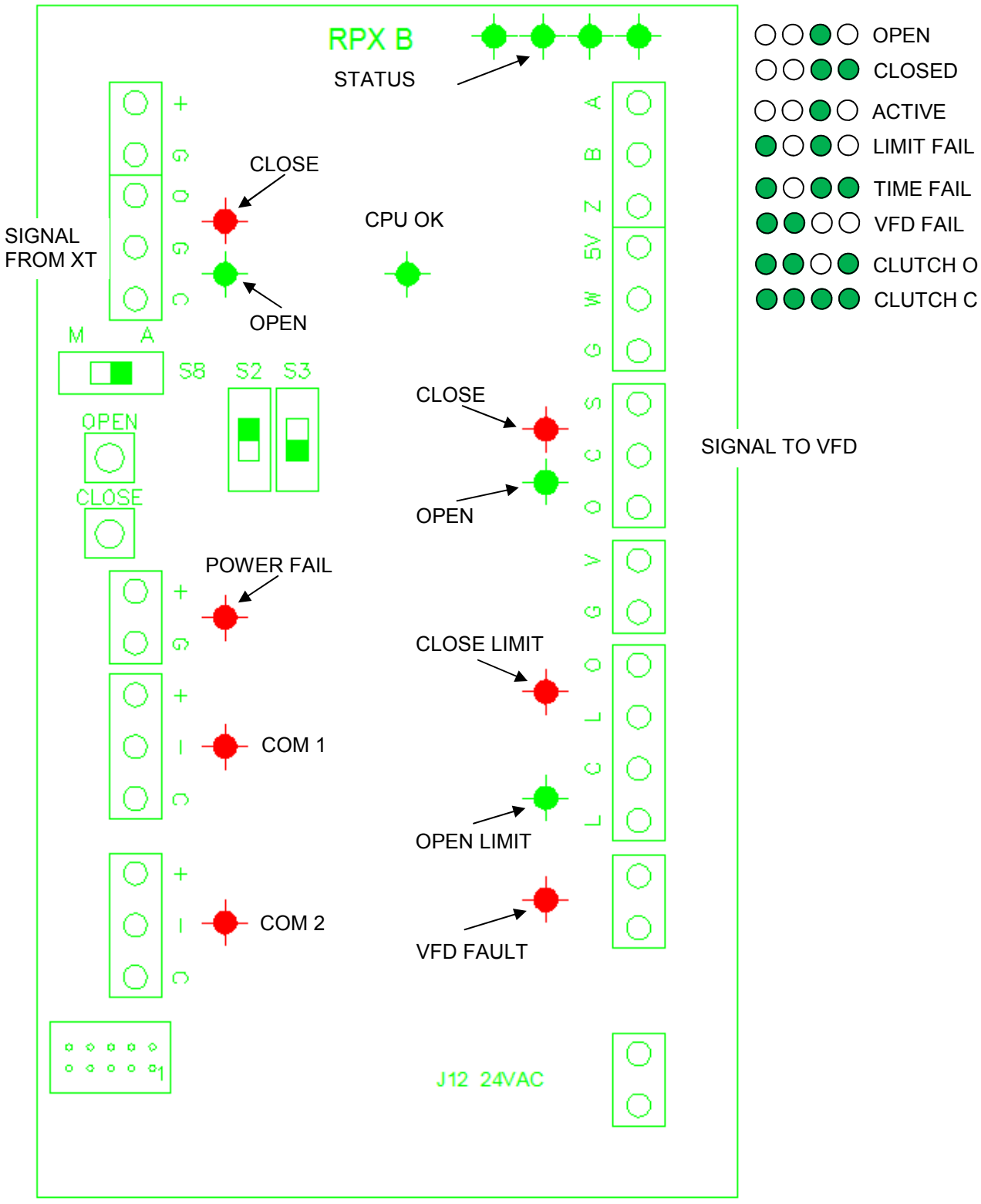
VFD Fail: If a VFD faults, the door will stop in its current position. It will show up as Fuse on the Java door display. The next stage will be active and skip of the faulted stage.

Clutch Active: If the clutch is active or the hall effect sensor fails, the stage will shut down and the next stage will be active. The reset timer will start timing, at time out it will try and run again. If the count is 10 or less, the close limit will be zeroed. If the hall effect sensor were to fail it would act just like the clutch.

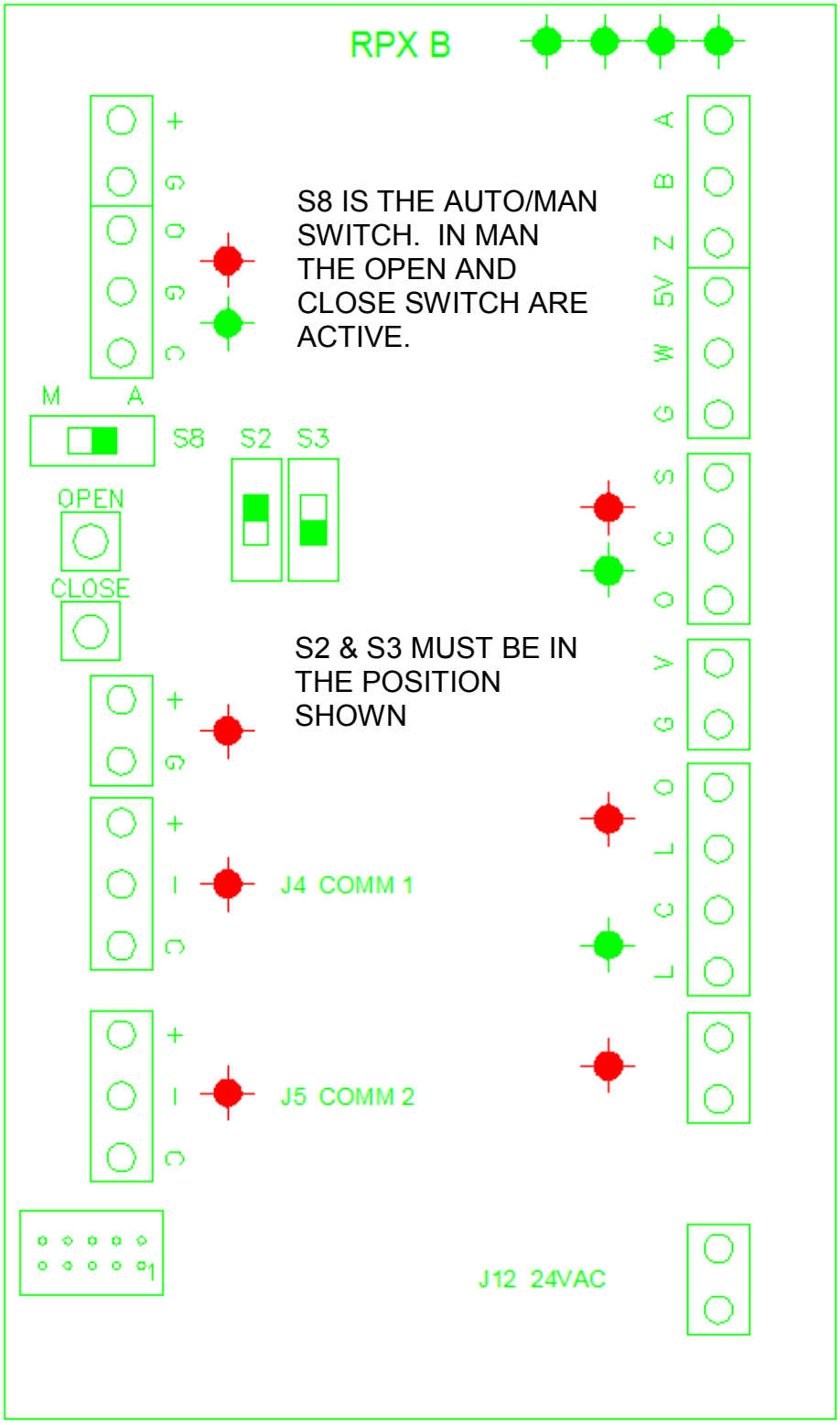
Limit Fail: If the close limit and the open limit are both open, there is a problem with the switch or wiring.

Timed Fail: If the doors does not reach the limit in the set amount of time, the door will go into a Timed Fail and active the next stage.

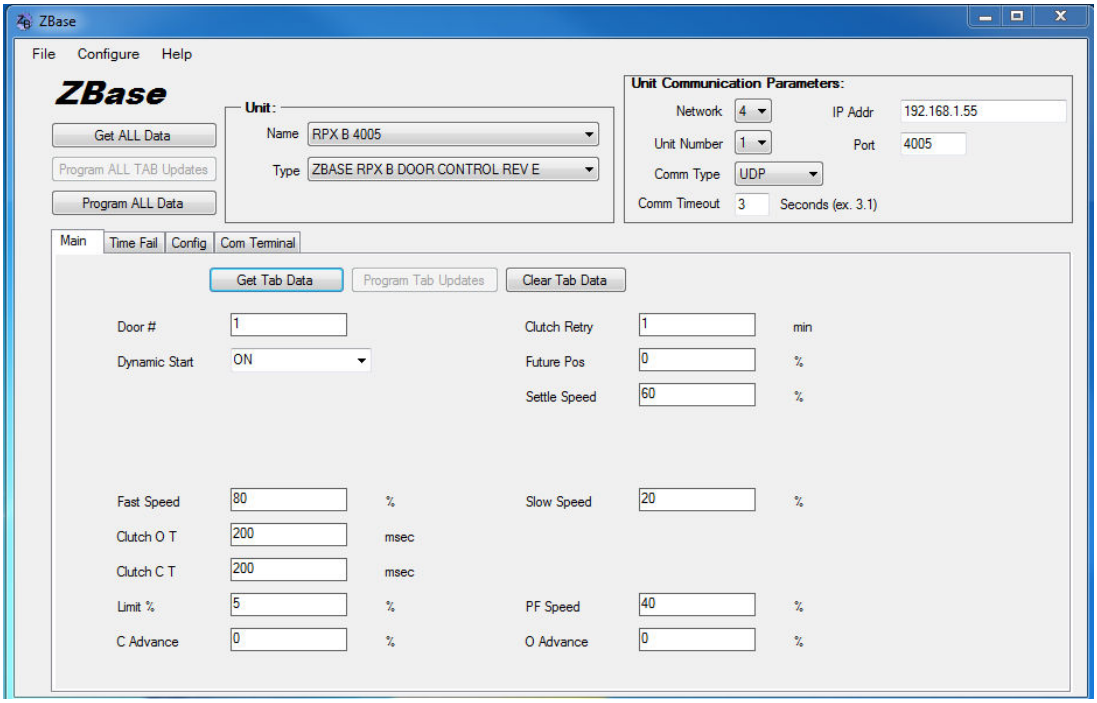
LED STATUS

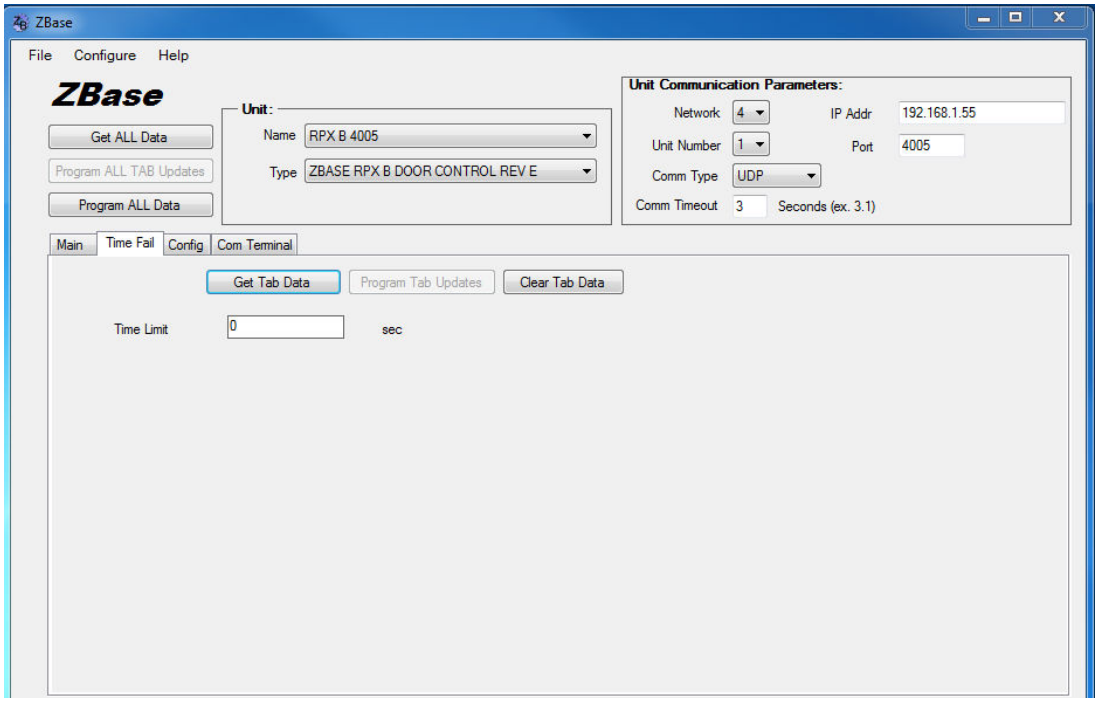

RPX B
STATUS
CLOSE
OPEN
SIGNAL FROM XT
CPU OK
M
A
S8
S2
S3
OPEN
CLOSE
POWER FAIL
COM 1
COM 2
J12 24VAC
CLOSE
OPEN
CLOSE LIMIT
OPEN LIMIT
VFD FAULT
SIGNAL TO VFD
OPEN
CLOSED
ACTIVE
LIMIT FAIL
TIME FAIL
VFD FAIL
CLUTCH O
CLUTCH C

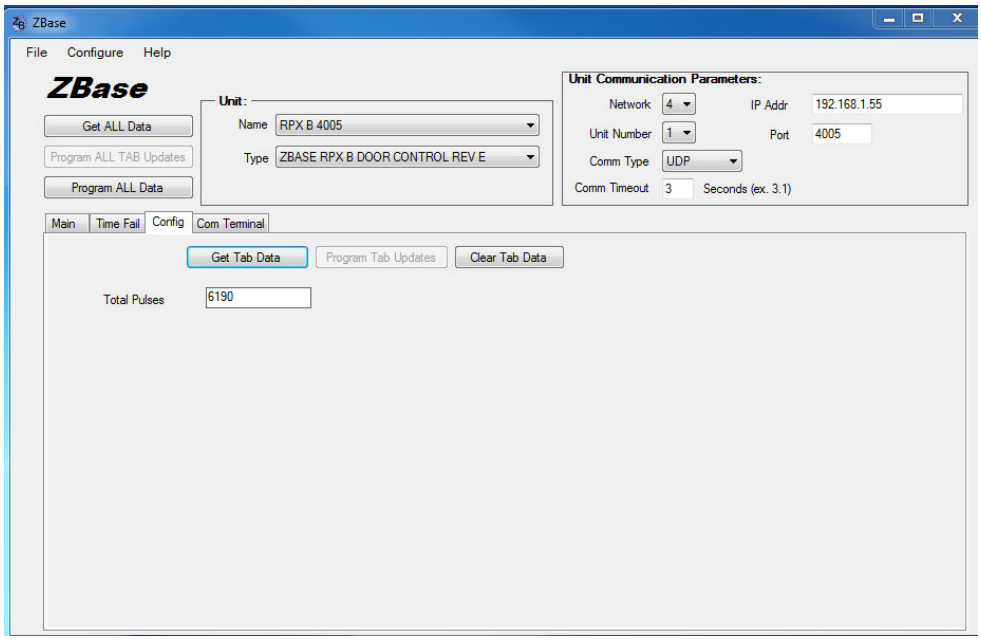
SWITCH STATUS

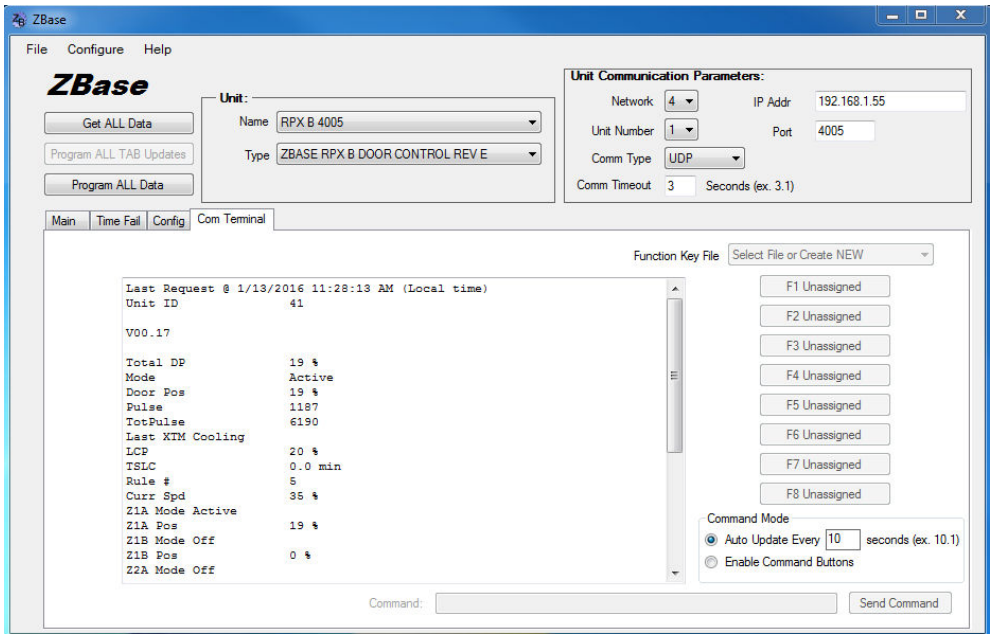


ZBASE EXAMPLE






ZBase
File Configure Help
ZBase
Get ALL Data
Program ALL TAB Updates
Program ALL Data
Unit:
Name RPX B 4005
Type ZBASE RPX B DOOR CONTROL REV E
Unit Communication Parameters:
Network 4
IP Addr 192.168.1.55
Unit Number 1
Port 4005
Comm Type UDP
Comm Timeout 3
Seconds (ex. 3.1)
Main Time Fail Config Com Terminal
Get Tab Data
Program Tab Updates
Clear Tab Data
Total Pulses 6190


ZBase
File Configure Help
ZBase
Get ALL Data
Program ALL TAB Updates
Program ALL Data
Unit:
Name RPX B 4005
Type ZBASE RPX B DOOR CONTROL REV E
Unit Communication Parameters:
Network 4
IP Addr 192.168.1.55
Unit Number 1
Port 4005
Comm Type UDP
Comm Timeout 3
Seconds (ex. 3.1)
Main Time Fail Config Com Terminal
Function Key File Select File or Create NEW
Last Request @ 1/13/2016 11:28:13 AM (Local time)
Unit ID 41
V00.17
Total DP 19 %
Mode Active
Door Pos 19 %
Pulse 1187
TotPulse 6190
Last XTM Cooling
LCP 20 %
TSLC 0.0 min
Rule # 5
Curr Spd 35 %
Z1A Mode Active
Z1A Pos 19 %
Z1B Mode Off
Z1B Pos 0 %
Z2A Mode Off
F1 Unassigned
F2 Unassigned
F3 Unassigned
F4 Unassigned
F5 Unassigned
F6 Unassigned
F7 Unassigned
F8 Unassigned
Command Mode
Auto Update Every 10 seconds (ex. 10.1)
Enable Command Buttons
Command:
Send Command

Appendix A

RPX Auto Speed and Position Control 1-13-16

Parameters:

TSLC - Time Since Last Cooling. The RPX will keep track of the time since it was last in cooling until the new cooling cycle. On initial power up of the RPX all information will be zeroed.

LCP - Last Cooling Position. When the system switches out of cooling, it will record the last known door position.

LOSA - Last Outside Air Temperature when cooling was terminated.

STS - Settling Time Speed. The speed at which the doors will run for the first 10 minutes of Cooling. Set to zero to turn off Dynamic Speed Control.

FS - Fast Speed. Speed at which door runs to close the door.

SS - Slow Speed. Speed at which door runs when at limit window.

OS - Operational Speed. Speed at which door runs when in ASC (auto speed control)

Parameters available at the RPX:

XT Mode

XT Sec Mode

OSA Temp

Setpoint

Plen Temp

OSA Error = Setpoint – OSA Temp (include neg OSA as a positive error)

Example - Setpoint = 40 OSA = -10 Error = 50 degrees

SP Error = PL - SP

Appendix A

Dynamic Start - Activates Rule # 1. Set STS = 0 to disable the rest of the rules.

1 Rule If system has just started and TSLC is less than 60 min then run door to LCP position. If LCP is < 10% then set LCP = 0. If current OSA is within 3 degrees of LOSA then bypass the 60 min requirement and run door to LCP position.

2 Rule If < 10 minutes since start of cooling cycle then OS = STS.

3 Rule If SP Error > 2.0 then OS = FS

4 Rule If OSA ERROR > 50 then OS = SS

5 Rule OS = (FS – SS)(50 – OSA ERROR)/50 + SS

Note - Rule # 5 linearizes the speed base on the OSA ERROR. Max OSA ERROR is 50 degrees which would be a speed of SS. Min OSA ERROR is 0 degrees and the speed would be FS.