creative conners, inc.

Deck Chief™ Manual

Version 1.2

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Getting Started

The Deck Chief is simple motor controller designed for theatre. For applications where ease-of-use is paramount, the Deck Chief provides intuitive push-button operation with variable speed, soft-start, limit switch inputs, and an optional remote control pendant. For traveler curtains, roll-down screens, display turntables, simple slip stages, or many other motorized devices found on stage the Deck Chief is ideal.

This manual will guide you through:

- Unpacking
- Installation
- Powering up
- Operation

If you need help along the way contact us on our website (creativeconners.com), via email (support@creativeconners.com), or by phone (401-289-2942)

What's in the box?

Inside the box you should find:

- Reference manual (this document)
- Deck Chief motor controller
- 6-pin power input connector
- 10-pin motor & brake plug
- 6-pin limit plug
- 12-pin remote pendant terminator plug

If any of these items are missing, please contact us immediately for a replacement.

If you purchased any power cables, limit switches, or other accessories, those items are packaged separately.

Deck Chief Features

The Deck Chief was created to satisfy the need for simple and safe variable-speed operation of motorized curtains, turntables, projection screens and other effects in theatrical facilities and live event venues. It features:

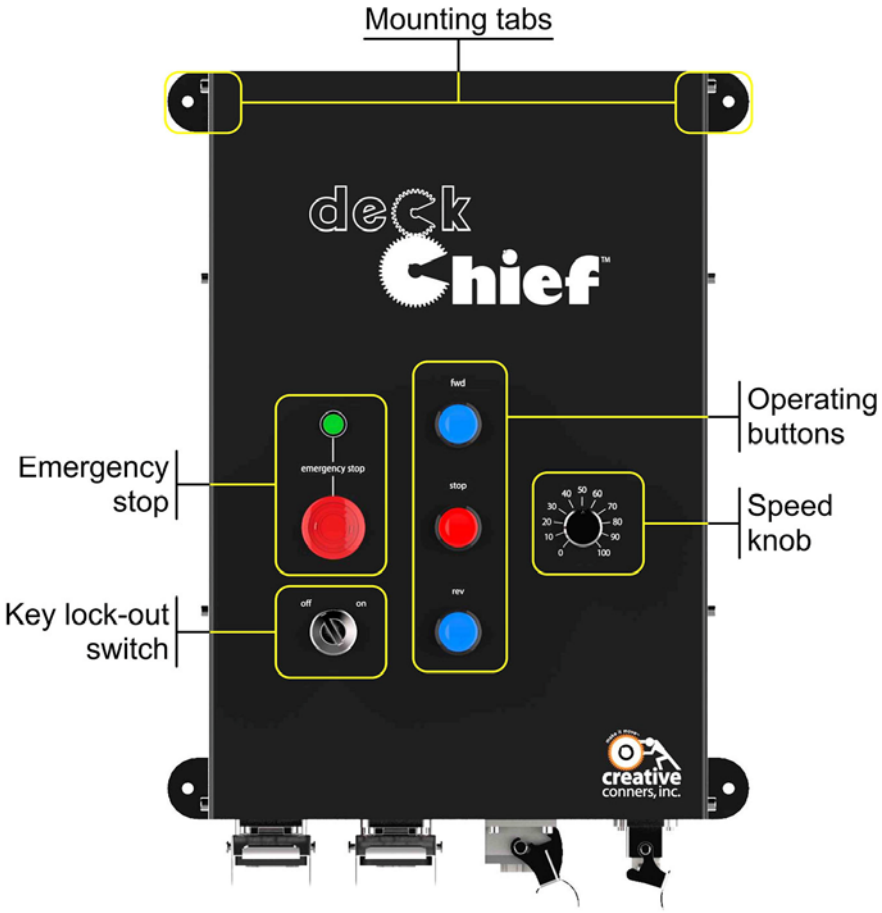


Figure 1

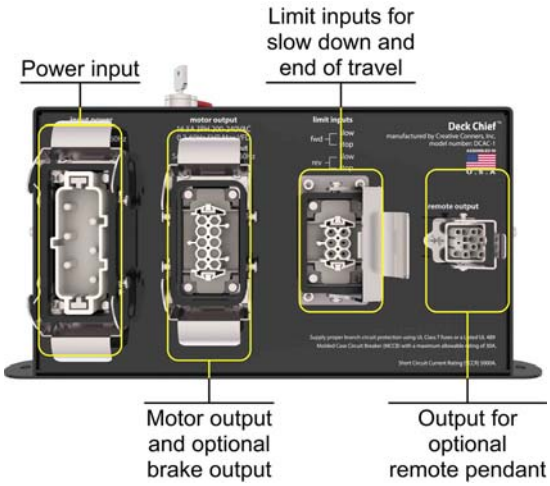


Figure 2

Installation

The Deck Chief is designed to be mounted to a wall or other vertical flat surface using the 4 mounting tabs on the case. When selecting a mounting fastener, keep in mind that the Deck Chief weighs close to 40lbs and will need sufficient mounting hardware. The locations of the mounting holes are shown in the dimensioned drawing below.

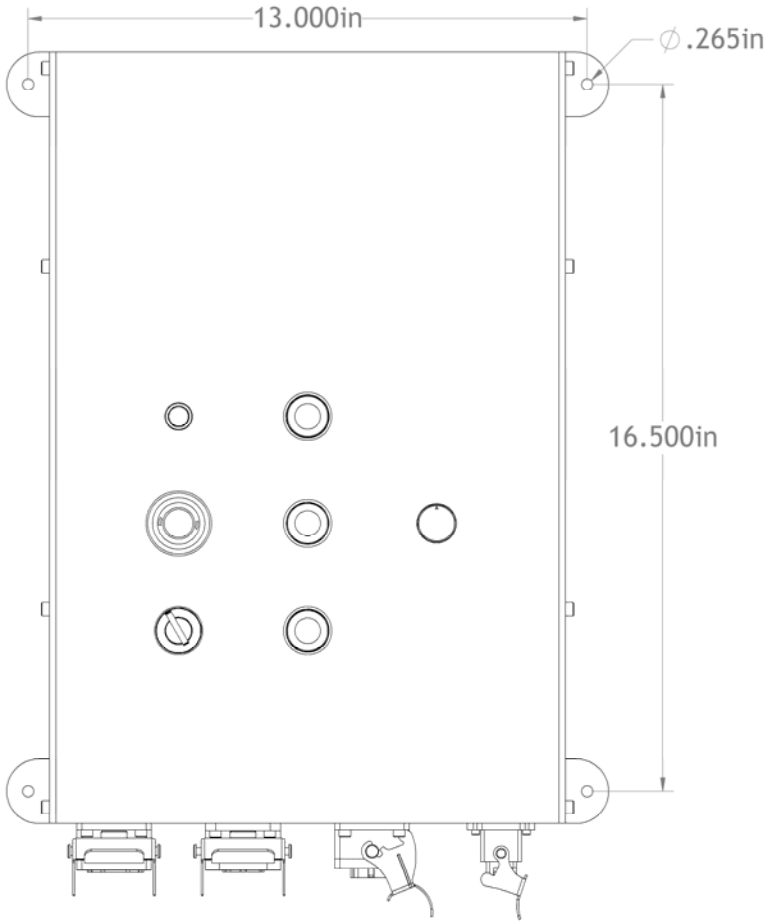


Figure 3

Powering Up

After the Deck Chief is installed, it is time to power it up and get your machine spinning. The Deck Chief 5HP requires a 30-amp, 200VAC-240VAC, 3-phase, 4-wire circuit (3 hot legs and a ground). There is no internal branch circuit protection, so you must power the Stagehand from a branch circuit with proper over-current protection.

Power Input Connection

The power inlet on the Deck Chief is a 6-pin rectangular plug (Automation Direct Part #ZP-MC16B-1-MS006). The pin-out is shown below:

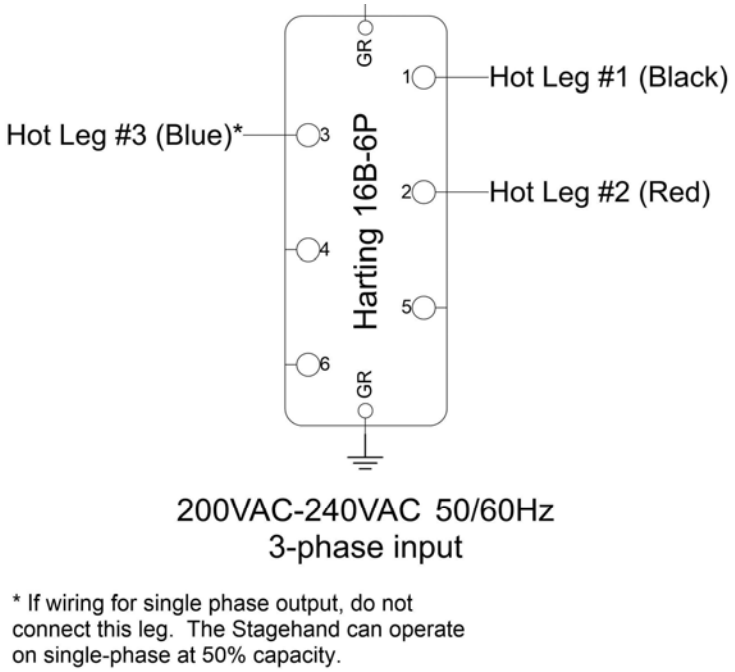


Figure 4

Motor and Brake Connections

Power output connections for a motor and spring-set, fail-safe brake have been combined into a single connector. The connector is a 10-pin rectangular receptacle (Automation Direct Part #ZP-MC10B-1-FS010). The pin-out is shown below:

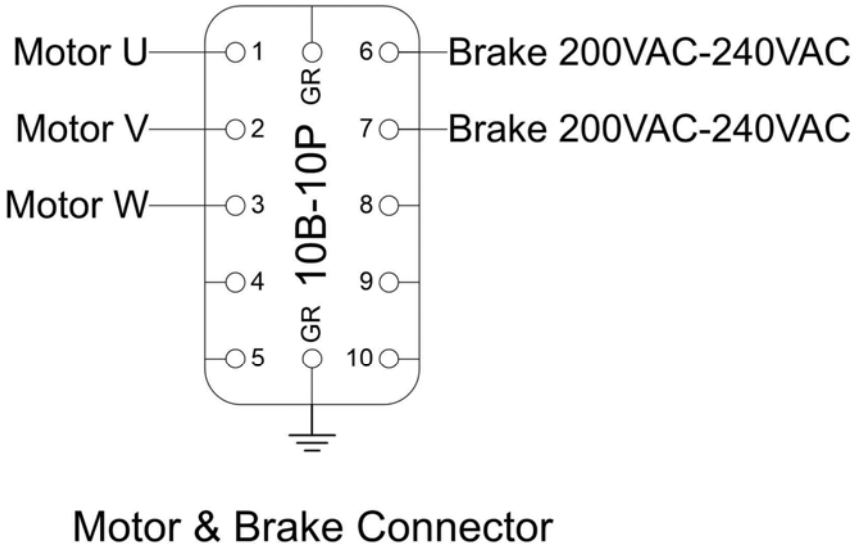


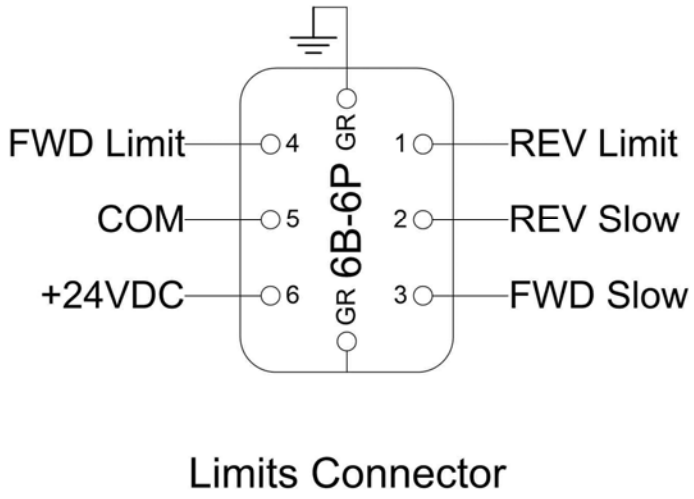
Figure 5

- Motor Power – 230vac 3-phase 16A max, variable frequency from 0Hz-60Hz
- Motor Brake Power – 200/240vac 1-phase 5A max 50/60Hz.

Motor power is provided by the internal Mitsubishi D700 variable frequency drive (VFD). When the motor is moving, power will be output on the Brake circuit. If a spring-set brake is used, it will be energized and thereby released allowing the motor to move. As soon as the motor movement is complete, power will be removed from the Brake circuit and the brake will engage.

Limits Connection

The Deck Chief is wired to accept signals from four separate limit switches. All switches should be wired Normally-Closed (N.C.). If any signal is not used, a jumper should be installed in the Limit Plug to disable the signal. The connector is a 6-pin rectangular receptacle (Automation Direct Part #ZP-MC06B-1-FS006). The pin-out is shown below:



Limits Connector

Figure 6

- REV Limit – When there is a closed circuit between COM and REV Limit, motion will be allowed in the reverse direction. When the circuit is open, no further motion will be allowed in the reverse direction.
- REV SLOW – When there is a closed circuit between COM and REV Slow, motion in the reverse direction will be allowed at the speed set by the Speed Knob. When the circuit is open, reverse motion will only be allowed to proceed at the preset SLOW speed. From the factory, the SLOW speed is set to 5Hz (~8%).
- FWD Slow – When there is a closed circuit between COM and FWD Slow, motion in the forward direction will be allowed at the speed set by the Speed Knob. When the circuit is open, forward motion will only be allowed to proceed at the preset SLOW speed. From the factory, the SLOW speed is set to 5Hz (~8%).
- FWD Limit – When there is a closed circuit between COM and FWD Limit, motion will be allowed in the forward direction. When the circuit is open, no further motion will be allowed in the forward direction.

Note: Pin 6 provides a constant +24VDC supply that can be used to power NPN (sinking) proximity switches with N.C. outputs such as Automation Direct Part #PFK1-BN-3H.

At this point, we should stop and discuss the basic operation of the Deck Chief to shed some light on why there are four separate input signals for limit switches. One of the traditional challenges with using limit switches for positioning is the amount of drift that a motor will experience after a limit switch is struck. You must calibrate the switch position to allow for a enough over-travel after the switch is struck. That works fine, until the speed of the motor is changed. The faster the motor is moving when it hits the limit switch, the farther it will drift. To combat this problem the Deck Chief uses a SLOW limit switch. Once the motor hits the SLOW limit switch, it will decelerate to a preset, constant speed. The motor will continue to travel at the SLOW speed until the final LIMIT switch is struck and then it will decelerate to a stop. This allows the motor speed to be adjusted freely, since it will always approach the final LIMIT switch from a preset SLOW speed.

When setting the switch positions, you should set the position of the FWD SLOW switch so that it will be struck before the FWD LIMIT when moving forward. It follows that you should also set the position of the REV SLOW switch so that it is struck before the REV LIMIT when moving forward. The diagram below shows a schematic of how the motor will move in the forward direction.

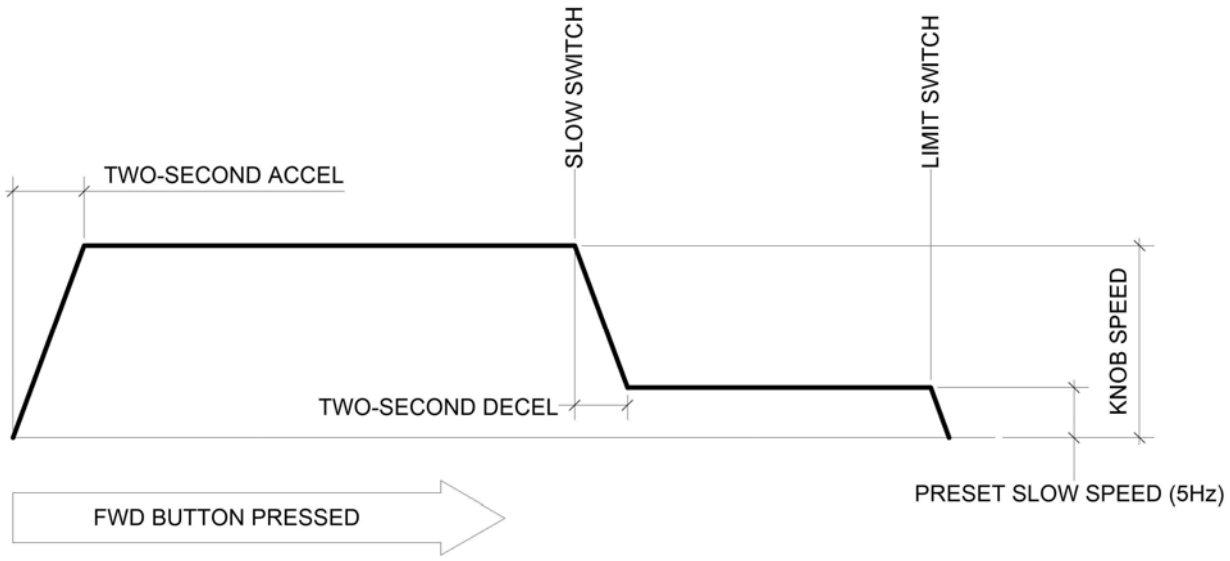


Figure 7

To describe the sequence depicted above:

- The forward button is pressed and released.
- The motor accelerates to the speed set on the knob in two seconds.
- The motor continues forward at the knob speed until the forward slow switch is struck.
- When the forward slow switch is struck, the motor decelerates to the fixed SLOW speed in two seconds.
- The motor will continue to move forward at the fixed SLOW speed (not affected by the knob) until the forward limit switch is struck.
- When the forward limit switch is struck, the motor decelerates to a stop in two seconds.

Remote Pendant

The Deck Chief has a connector for an optional Remote Pendant. The Remote Pendant has an Emergency Stop circuit and therefore it either must be connected, or the provided Pendant Terminator plug must be inserted to defeat the Remote Pendant feature.

Using the Deck Chief

Once all of your connections are made, either by plugging in a pre-wired Creative Conners machine or by wiring up your own machine, the next step is to power up and make something move. It is a good idea to do the initial movements without any load attached. Once you are comfortable that everything is working properly, then you can attach your curtain, screen, turntable, etc.

Move the Motor

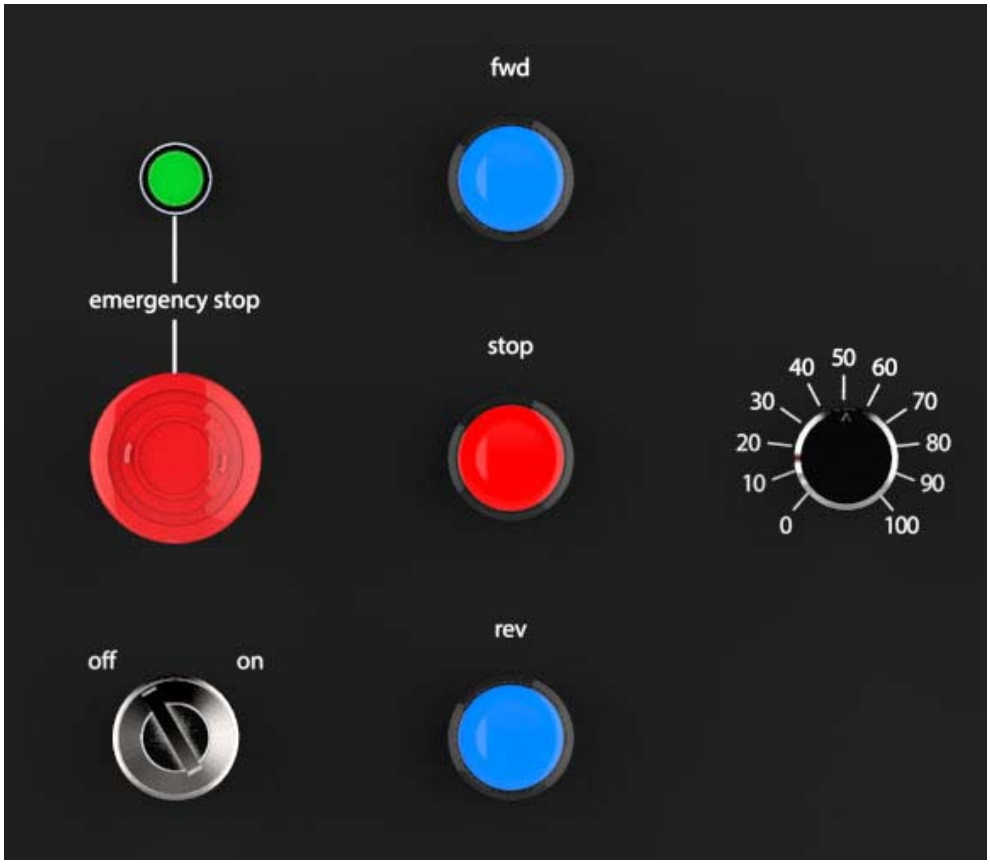


Figure 8

Moving the motor with the Deck Chief is simple.

- Confirm that the key switch is turned ON.
- Install either the provided Remote Terminator, or a Remote Pendant.
- Set the desired speed on the knob.
- Press either the FWD or REV button. The buttons are illuminated when the respective limit switch is not struck. In other words, if the FWD button is illuminated, you can press the button and the motor will move forward. If the FWD limit is engaged, the button will be dark and pressing the button will have not effect.

Once the motor is moving, the button that correlates to the direction of travel will quickly blink indicating that the motor is moving at the speed selected on the knob. If the appropriate SLOW switch is struck, the button will blink slowly indicating that the motor is moving at the preset SLOW speed.

The Deck Chief operates in a "latching" mode. Once you press a button, the Deck Chief will continue to run until you press a stop button or the motor hits a limit switch. This is in contrast to "dead-man" operation where the operation button must be depressed constantly. There should be obvious safety implications to this design choice. The Deck Chief is intended for use in applications where unattended motion will not cause harm to people. If you are moving heavy things quickly that could collide with people, consider our Stagehand controllers that are built for such applications.

Stop the Motor

There are two methods of stopping the motor before it reaches one of its limit switches.

- Press the STOP button. The motor will decelerate to a stop within two seconds.
- Press the Emergency Stop button. The motor will stop instantly and the brake will be applied instantly.

If you press the Emergency Stop button, a few things happen:

- Power is removed from the motor output circuit.
- Power is removed from the brake circuit, engaging the brake.
- Both direction buttons will darken, indicating that no movement can take place while the emergency stop is active.
- The light above the Emergency Stop button will illuminate, showing that the emergency stop circuit is activated.

To release the Emergency Stop button, turn it clockwise. It will spring back to a released state. If all is well, the FWD and REV buttons will illuminate again.

The Emergency Stop circuit uses a dedicated safety module that will detect any problems with either the Emergency Stop button, or the safety circuit that guarantees power is removed from the motor during an emergency. If you release the Emergency Stop button and the FWD and REV buttons do not illuminate, it could mean that an internal safety component has failed and to insure safe operation the dedicated safety module will not allow motion. If that occurs, please give us a call to help troubleshoot or return the Deck Chief for service.

Lock Out Unauthorized Users

The Deck Chief may be permanently installed in a facility and should be protected from accidental or malicious operation. Beneath the Emergency Stop button a key switch is provided to lock out the operation panel. Simply turn the key switch to OFF and remove the key for safe keeping. The key switch is a Square D part # ZB5AG2. If you need a replacement key one can be ordered from Creative Conners or your favorite Square D distributor.

Drive Fault

Internally, the Deck Chief uses a high-quality Mitsubishi D700 VFD to power the motor. There are various conditions that can cause the VFD (variable frequency drive) to enter a fault condition. Low voltage, over-current, disconnected motor are just a few examples. If the drive faults, the FWD & REV buttons will flash in an

alternating pattern. To reset the drive and try to move again, press and hold both the FWD and REV buttons for a few seconds. The Deck Chief will attempt to reset the drive and restore normal operation. If the drive continues to fault regularly, give us a call to help troubleshoot.

Troubleshooting

If you've reached this section of the manual, things aren't going well. We are very sorry, but we are always here to help. Our various methods of communication can be found in the Technical Support section.

Technical Support

Despite our best efforts and intentions to provide reliable equipment and clear instructions, there may come a time that you need more direct, personal help. We are happy to do that too. Please get in touch in whatever way is most convenient:

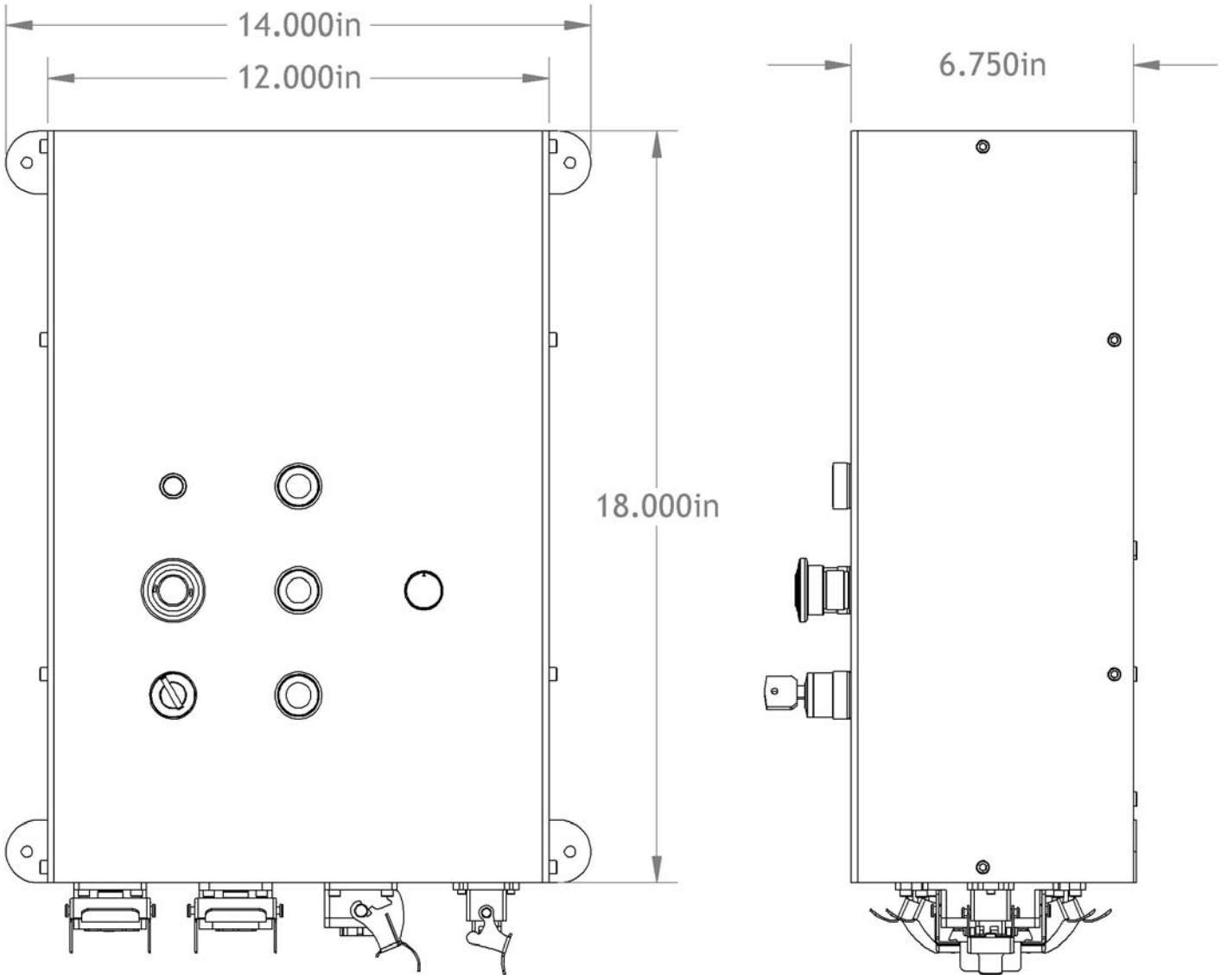
- Phone: 401-289-2942. We're open weekdays 8:30am – 5:00pm EST. If you call outside of normal business hours (like during tech, or pre-show check, or intermission), one of us will be on-call with a cell-phone gaff-taped to his hand. Listen to the message on our main phone number to get the cell phone number of the technician on-call.
- Fax: 401-289-0259. Honestly, I don't think anyone uses the fax for tech support, but you are free to be the first.
- Email: support@creativeconners.com. Email can be really convenient for tech support if you don't have a time-critical problem. If you are having trouble with a specific cue in a show, please email us your show file and log file from Spikemark with a description of the issue. We respond within 24 hours, but usually it's just a matter of minutes.
- Web forum: http://creativeconners.com/phpBB3/. Our forum has some cobwebs these days, not too many folks prefer it over the phone or email, but we still check it religiously every day and answer any questions that come up.

Specifications

Electrical Specifications

Description	Value
Input Voltage	200VAC-240VAC 50/60Hz 3P or 1P (single-phase input derates output power by 50%)
Max Input Current	30 amps. Supply proper branch circuit protection using UL Class T fuses or a Listed UL 489 Molded Case Circuit Breaker (MCCB) with a maximum allowable rating of 30A.
Motor Output Voltage	230VAC 0.2Hz-60Hz
Max Motor Output Power	3HP Heavy Duty 5HP Normal Duty
Min Motor Output Power	2HP *Adjust Mitsubishi VFD parameter 9 to reflect motor current rating. **Lower HP possible but auto-tuning is ineffective below 2HP
Minimum Motor Speed	.5Hz
Maximum Motor Speed	60Hz – 400Hz (make sure you do not exceed the rating of your motor)
Motor Brake Output Voltage	200VAC-240VAC 50/60Hz
Motor Brake Output Current	5A max
Limit Switch Voltage	24VDC
Limit Switch Current	10mA
Limit Switch Contact Type	Normally Closed (N.C.) dry contact

Physical Specifications



Default Mitsubishi Parameters

Parameter Code	Description	Value	Description
1	Maximum Frequency	120Hz	max output frequency
6	Low speed Frequency	5Hz	
7	Acceleration time	2	seconds
8	Deceleration time	2	seconds
9	Motor full load amps	16	
13	Starting frequency	0.5	Motor won't start until the speed signal is at least this value.
30	Regenerative function	1	External brake resistor, L1/L2/L3 power source
70	Regenerative brake duty	10%	duty cycle of the braking resistor
71	Motor type	3	Other mfg. standard motor
72	Carrier frequency	15	Reduces output noise
73	Analog input selection	1	Terminal 2 input 0 to 5V without reversing

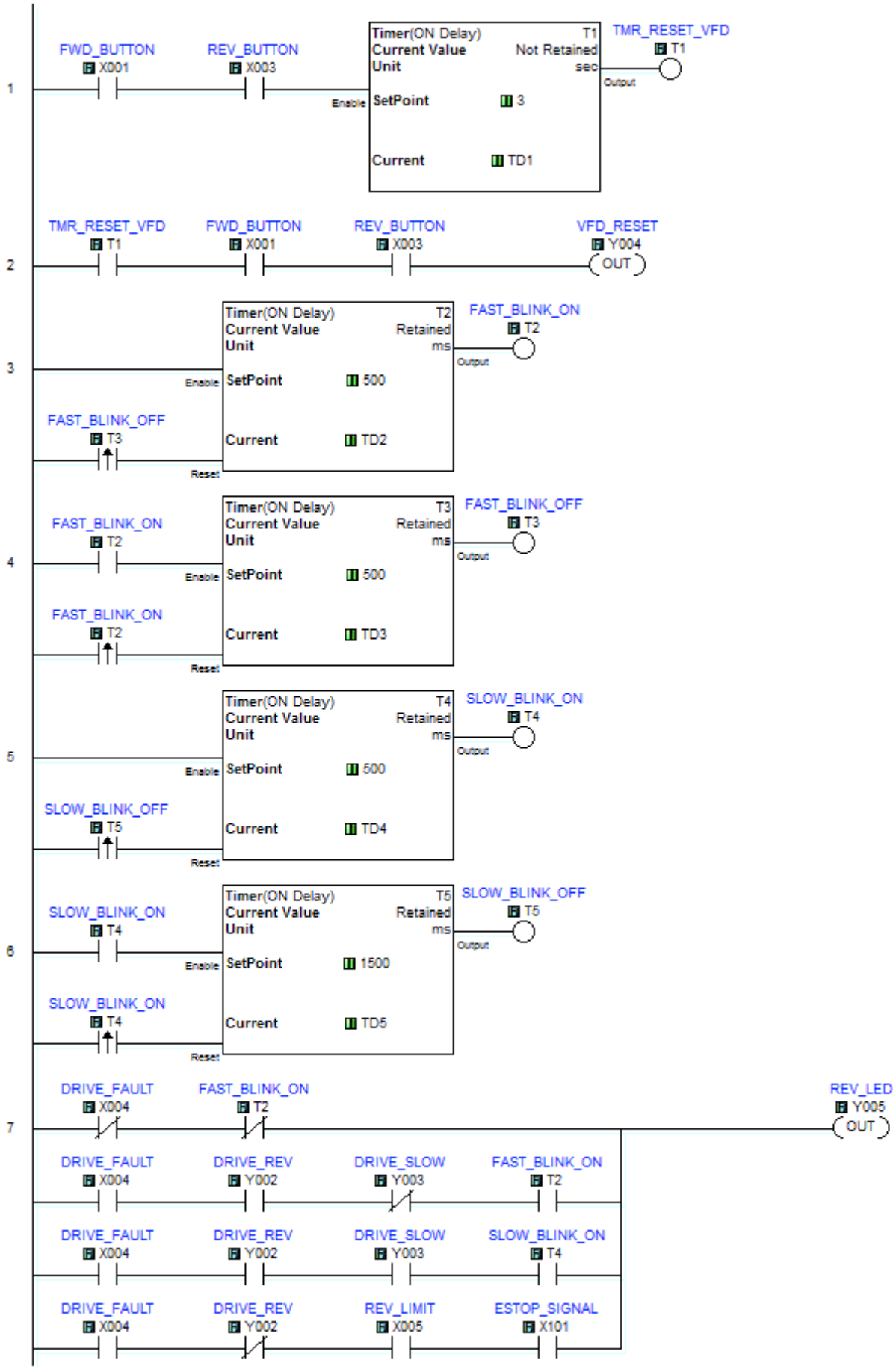
77	Parameter write selection	2	allow parameter writes regardless of status ****SET THIS ONE FIRST***
79	Control mode	2	Keypad disabled, external control
80	Motor capacity	3.7	kilowatts
83	Motor voltage	230V	
84	Motor rated frequency	60Hz	
125	Terminal 2 frequency setting gain frequency	60Hz	*** Max frequency (adjust for overspeed) ***
180	RL input terminal	0	low-speed operation (default)
181	RM input terminal	62	inverter reset
190	RUN output	0	Running
192	Relay output	199	Fault output (normally closed, opens if fault)
197	SO terminal	180	Safe Stop output (normally closed, opens if stopped)

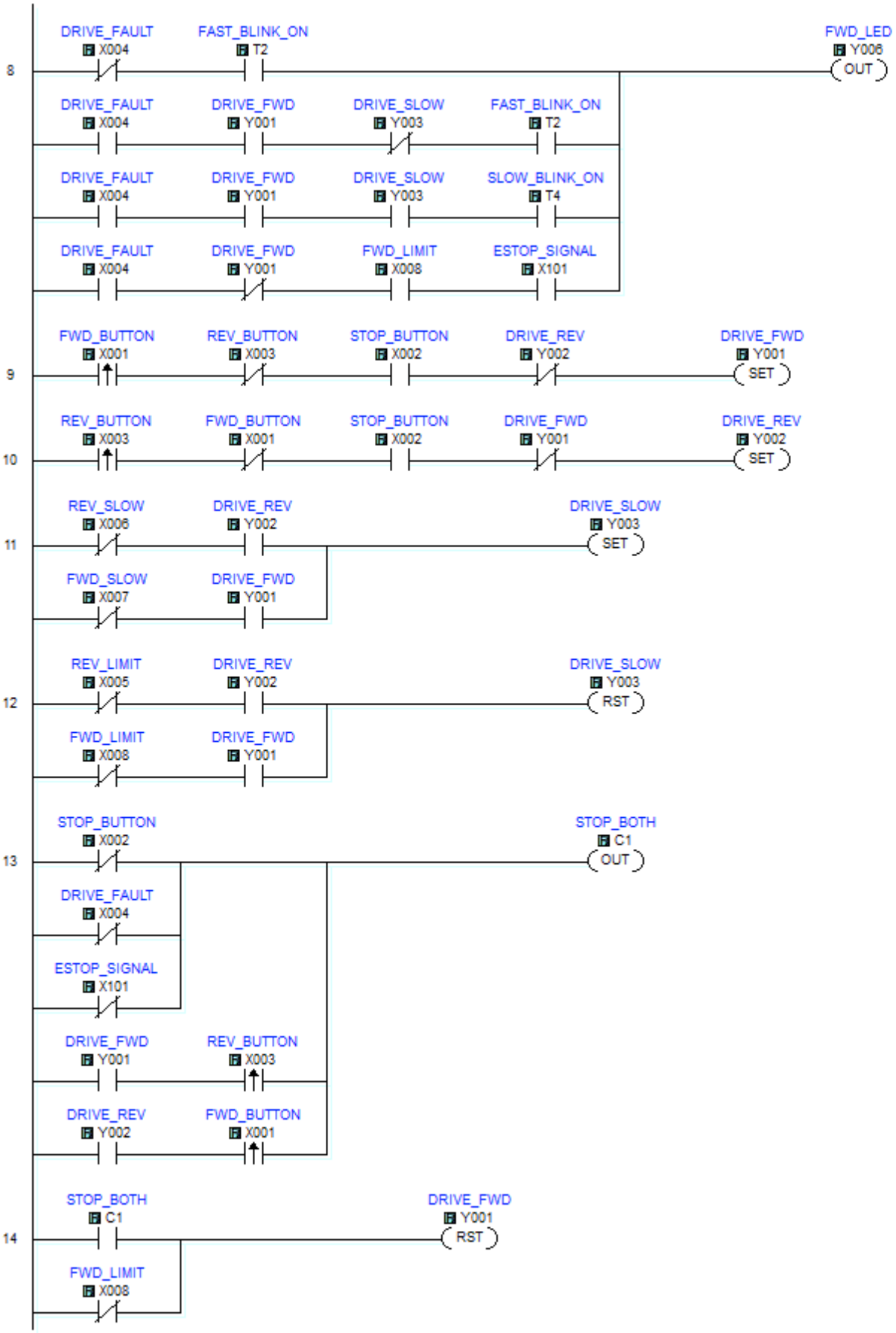
PLC Ladder for Mitsubishi

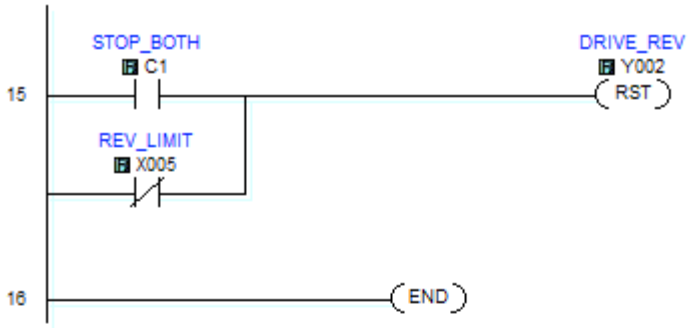
Following is the PLC Ladder program for the Deck Chief.

Wiring Diagram

Following is a C-size print of the Deck Chief wiring diagram.


1
FWD_BUTTON
X001
REV_BUTTON
X003
Enable
Timer(ON Delay)
Current Value
Unit
T1
Not Retained
sec
SetPoint
3
Current
TD1
TMR_RESET_VFD
T1
Output
2
TMR_RESET_VFD
T1
FWD_BUTTON
X001
REV_BUTTON
X003
VFD_RESET
Y004
OUT
3
Timer(ON Delay)
Current Value
Unit
T2
Retained
ms
SetPoint
500
Current
TD2
FAST_BLINK_ON
T2
Output
Enable
FAST_BLINK_OFF
T3
Reset
4
FAST_BLINK_ON
T2
Timer(ON Delay)
Current Value
Unit
T3
Retained
ms
SetPoint
500
Current
TD3
FAST_BLINK_OFF
T3
Output
Enable
FAST_BLINK_ON
T2
Reset
5
Timer(ON Delay)
Current Value
Unit
T4
Retained
ms
SetPoint
500
Current
TD4
SLOW_BLINK_ON
T4
Output
Enable
SLOW_BLINK_OFF
T5
Reset
6
SLOW_BLINK_ON
T4
Timer(ON Delay)
Current Value
Unit
T5
Retained
ms
SetPoint
1500
Current
TD5
SLOW_BLINK_OFF
T5
Output
Enable
SLOW_BLINK_ON
T4
Reset
7
DRIVE_FAULT
X004
FAST_BLINK_ON
T2
REV_LED
Y005
OUT
DRIVE_FAULT
X004
DRIVE_REV
Y002
DRIVE_SLOW
Y003
FAST_BLINK_ON
T2
DRIVE_FAULT
X004
DRIVE_REV
Y002
DRIVE_SLOW
Y003
SLOW_BLINK_ON
T4
DRIVE_FAULT
X004
DRIVE_REV
Y002
REV_LIMIT
X005
ESTOP_SIGNAL
X101


8
DRIVE_FAULT
X004
FAST_BLINK_ON
T2
FWD_LED
Y006
OUT
DRIVE_FAULT
X004
DRIVE_FWD
Y001
DRIVE_SLOW
Y003
FAST_BLINK_ON
T2
DRIVE_FAULT
X004
DRIVE_FWD
Y001
DRIVE_SLOW
Y003
SLOW_BLINK_ON
T4
DRIVE_FAULT
X004
DRIVE_FWD
Y001
FWD_LIMIT
X008
ESTOP_SIGNAL
X101
9
FWD_BUTTON
X001
REV_BUTTON
X003
STOP_BUTTON
X002
DRIVE_REV
Y002
DRIVE_FWD
Y001
SET
10
REV_BUTTON
X003
FWD_BUTTON
X001
STOP_BUTTON
X002
DRIVE_FWD
Y001
DRIVE_REV
Y002
SET
11
REV_SLOW
X006
DRIVE_REV
Y002
DRIVE_SLOW
Y003
SET
FWD_SLOW
X007
DRIVE_FWD
Y001
12
REV_LIMIT
X005
DRIVE_REV
Y002
DRIVE_SLOW
Y003
RST
FWD_LIMIT
X008
DRIVE_FWD
Y001
13
STOP_BUTTON
X002
STOP_BOTH
C1
OUT
DRIVE_FAULT
X004
ESTOP_SIGNAL
X101
DRIVE_FWD
Y001
REV_BUTTON
X003
DRIVE_REV
Y002
FWD_BUTTON
X001
14
STOP_BOTH
C1
DRIVE_FWD
Y001
RST
FWD_LIMIT
X008


STOP_BOTH
C1
DRIVE_REV
Y002
15
RST
REV_LIMIT
X005
16
END

Revisions

10-16-13	Removed redundant estop contactors	12-30-13	Flipped polarity on buttons	1-1-14	Changed Stop button to N.C.
10-16-13	Changed to single channel safety relay	12-30-13	Added aux plc i/o for stopped signal	1-15-14	Moved limit pin 6 to unswitched 24vdc

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Deck Chief Wiring Diagram

drawn on: 10-14-13
revised: 1-15-2014
scale:nts

230vac 3-phase input

Harting 16B-6P

LED3 (RED)
E-STOP

safemaster
LG5925

SET TO:
CROSS FAULT DETECTION
AUTOMATIC RESTART

Mitsu D700

brake resistor

Schneider
Contactor
LP4K06

10B-10P

Motor/Brake
Output

Remote Pendant

Click PLC

SW1 - FWD

SW2 - STOP

SW3 - REV

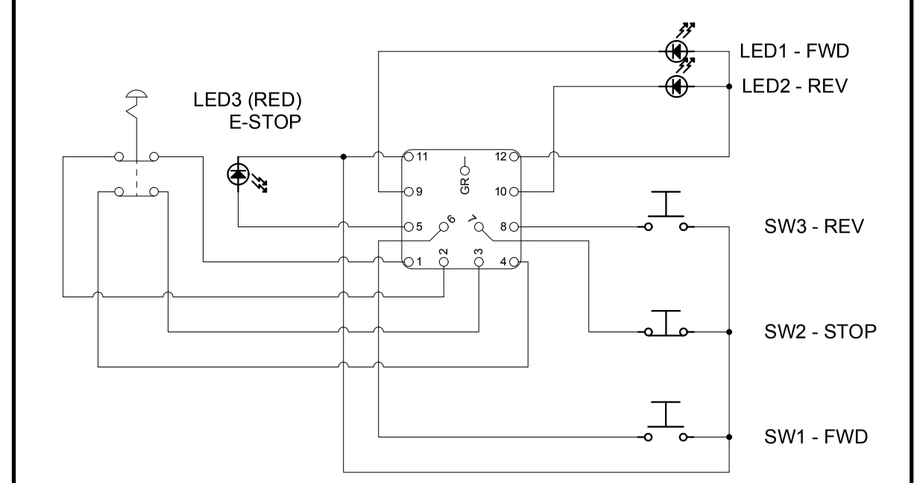
6B-6P

LED1 - REV
LED2 - FWD

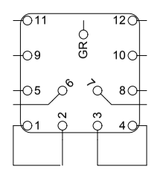
2W 1k

Power
Supply
60W

Click I/O
C0-16CDD1



remote pendant



estop terminator