



Touchscreen Console Integrator's Guide

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How to use this guide

Scope of this publication

The purpose of this guide is to provide information about how to integrate the Thermo Scientific Touchscreen Console for S.U.M. systems with third-party controllers. It provides an overview of the Touchscreen Console, the intended use of each electrical component, and specific wire/pin out definitions. **Note:** This guide may not cover unique, custom, or customer-specific changes to system components.

Document change information

Revision	Date	Section	Change made	Author
A	12/2018	--	Initial release	E. Hale
B	03/2020	--	Updated formatting	T. Golightly

Questions about this publication

If you have any questions or concerns about the content of this publication, please contact **technicaldocumentation@thermofisher.com** and your Thermo Fisher Scientific sales team.

Related publications

Please contact your local sales representative for information about the related publication(s) listed below, which provide safety, operating, and specifications information.

Publication	Document number
Thermo Scientific HyPerforma S.U.M. with Touchscreen Console User's Guide	DOC0042
Thermo Scientific HyPerforma S.U.M. with Touchscreen Console Unpacking Guide	DOC0061

1

Touchscreen Console overview

Figures 1.1 and 1.2 illustrate the front and back panels of the Touchscreen Console.



Figure 1.1. Front view of the Touchscreen Console.

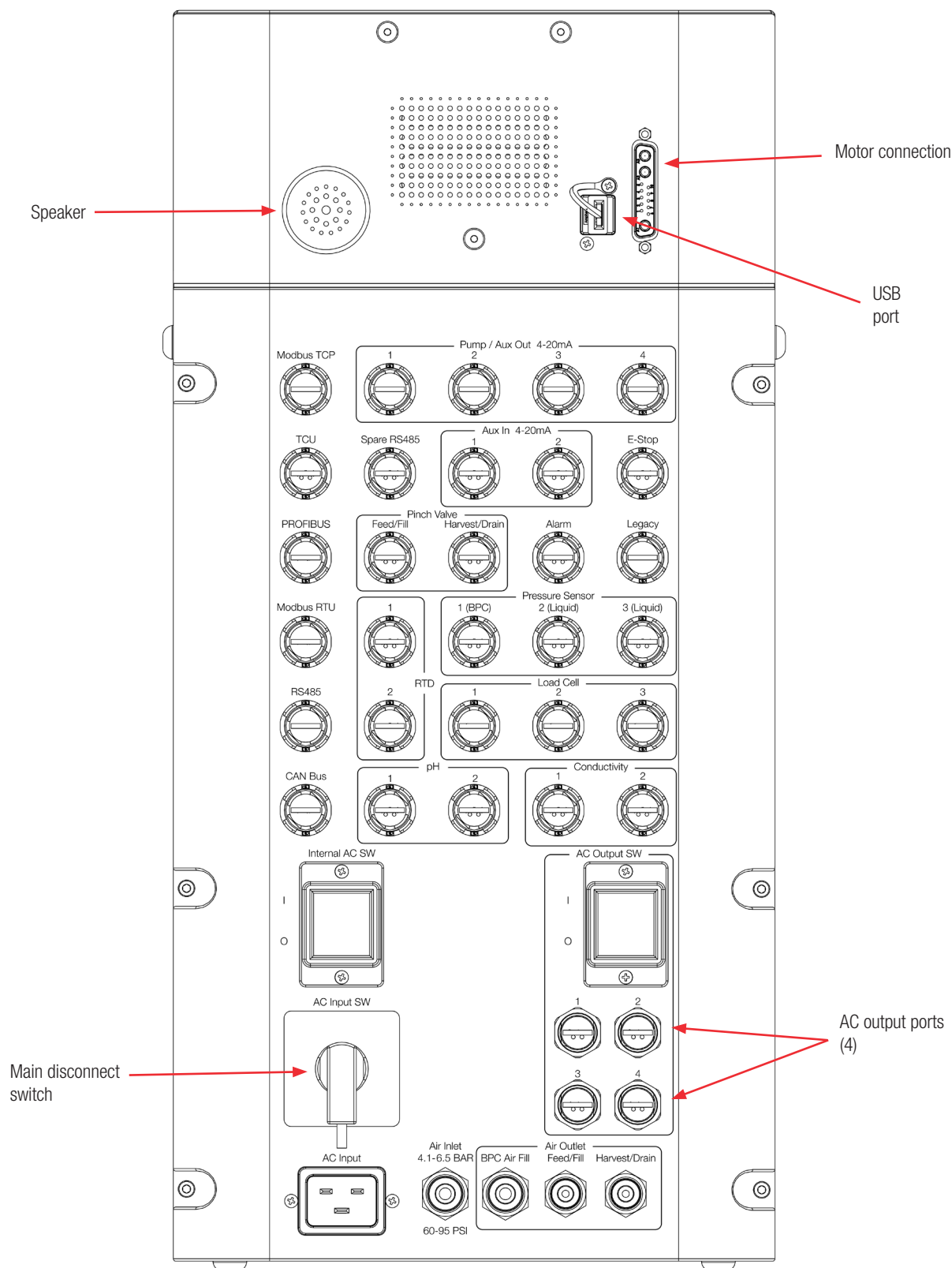


Figure 1.2. Back view of the Touchscreen Console.

2

Modbus address definitions

Table 2.1. Modbus input registers.

Name	Modbus address	Description
pH 1 PV	0	pH1 process value (signed 16 bit 0.01 pH)
pH 2 PV	1	pH2 process value (signed 16 bit 0.01 pH)
Conductivity 1	2	Conductivity 1 process value (unsigned 16 bit 0.5 S/cm)
Conductivity 2	3	Conductivity 2 process value (unsigned 16 bit 0.5 S/cm)
Temperature 1	4	Temperature (RTD) 1 process value (signed 16 bit 0.01°C)
Temperature 2	5	Temperature (RTD) 2 process value (signed 16 bit 0.01°C)
Pressure 1	6	Pressure 1 (BPC) process value (signed 16 bit 0.01 psi)
Pressure 2	7	Pressure 2 (inlet pressure) process value (signed 16 bit 0.01 psi)
Pressure 3	8	Pressure 3 (outlet pressure) process value (signed 16 bit 0.01 psi)
Pressure 4	9	Pressure 4 differential value (pressure 2–pressure 3) process value (signed 16 bit 0.01 psi)
Analog in 1	10	Analog in 1 process value (signed 16 bit 0.01 mA)
Analog in 2	11	Analog in 2 process value (signed 16 bit 0.01 mA)
Load cell	12	Load cell process value (unsigned 16 bit 0.1 kg)
Motor speed	13	Impeller motor speed (unsigned 16 bit 0.01 rpm)
TCU setpoint	14	Query TCU setpoint (signed 16 bit 0.01°C)
Motor setpoint	15	Impeller motor setpoint (unsigned 16 bit 0.01 rpm)

Table 2.2. Modbus holding registers.

Name	Modbus address	Description
Current transmitter 1	0	Current loop value (400–2000 correspond to 4 mA–20 mA)
Current transmitter 2	1	Current loop value (400–2000 correspond to 4 mA–20 mA)
Current transmitter 3	2	Current loop value (400–2000 correspond to 4 mA–20 mA)
Current transmitter 4	3	Current loop value (400–2000 correspond to 4 mA–20 mA)
Motor setpoint	4	Impeller motor setpoint (0–35600 correspond to 0 to 356 rpm)
TCU setpoint	5	TCU setpoint (0–10000 correspond to 0 to 100°C)
TCU high limit	6	TCU setpoint (0–10000 correspond to 0 to 100°C)
TCU low limit	7	TCU setpoint (0–10000 correspond to 0 to 100°C)

Table 2.3. Modbus coils registers.

Name	Modbus address	Description
Fill pinch valve control	0	Disable/enable pinch valve (0/1)
Harvest pinch valve control	1	Disable/enable pinch valve (0/1)
TCU control	2	Disable/enable TCU

Table 2.4. Modbus discrete inputs registers.

Name	Modbus address	Description
Fill pinch valve feedback	0	Status of pinch valve 0—Closed 1—Open
Harvest pinch valve feedback	1	Status of pinch valve 0—Closed 1—Open
E-Stop feedback	2	Status of E-Stop 0—Nonactive 1—Active
STO feedback	3	Status of STO motor cap 0—Nonactive 1—Active
TCU status	4	Status of TCU 0—Off 1—On
Alarm status	5	Status of alarm 0—Off 1—On

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Profibus I/O address definitions

Table 3.1. Profibus input data bytes—all values are in float with big-endian format. Note that these values are being sent from the Touchscreen Console (slave) to Master.

Name	Number of bytes	Byte address	Description (per unit)
pH 1 PV	4 (float)	0x0000	pH1 process value (0.01 pH)
pH 2 PV	4 (float)	0x0004	pH2 process value (0.01 pH)
Conductivity 1	4 (float)	0x0008	Conductivity 1 process value (0.5 S/cm)
Conductivity 2	4 (float)	0x000C	Conductivity 2 process value (0.5 S/cm)
Temperature 1	4 (float)	0x0010	Temperature (RTD) 1 process value (0.01°C)
Temperature 2	4 (float)	0x0014	Temperature (RTD) 2 process value (0.01°C)
Pressure 1	4 (float)	0x0018	Pressure 1 (BPC) process value (0.01 psi)
Pressure 2	4 (float)	0x001C	Pressure 2 (Inlet Pressure) process value (0.01 psi)
Pressure 3	4 (float)	0x0020	Pressure 3 (Outlet Pressure) process value (0.01 psi)
Pressure 4	4 (float)	0x0024	Pressure 4 differential value (pressure 2–pressure 3) process value (0.01 psi)
Analog in 1	4 (float)	0x0028	Analog in 1 process value (0.01 mA)
Analog in 2	4 (float)	0x002C	Analog in 2 process value (0.01 mA)
Load cell	4 (float)	0x0030	Load cell process value (0.1 kg)
Motor speed	4 (float)	0x0034	Impeller motor speed (0.01 rpm)
Fill pinch valve feedback	1 Byte	0x0038	Status of pinch valve (0/1)
Harvest pinch valve feedback	1 Byte	0x0039	Status of pinch valve (0/1)
E-Stop feedback	1 Byte	0x003A	Status of E-Stop (0/1)
STO feedback	1 Byte	0x003B	Status of STO motor cap (0/1)
TCU status	1 Byte	0x003C	Status of TCU (0/1)

Table 3.2. Profibus output data bytes—4 byte values are in float with big-endian format. Note that these values are being received from Master to the Touchscreen Console (slave).

Name	Number of bytes	Byte address	Description (per unit)
Current Loop1 control	1 (uint8)	0x0000	AUX1 control enable/disable
Aux1 setpoint	4 (float)	0x0001	Current value (4-20 mA)
Current Loop2 control	1 (uint8)	0x0005	AUX2 control enable/disable
Aux2 setpoint	4 (float)	0x0006	Current value (4-20 mA)
Current Loop3 control	1 (uint8)	0x000A	AUX3 control enable/disable
Aux3 setpoint	4 (float)	0x000B	Current value (4-20 mA)
Current Loop4 control	1 (uint8)	0x000F	AUX4 control enable/disable
Aux4 setpoint	4 (float)	0x0010	Current value (4-20 mA)
Motor control	1 (uint8)	0x0014	Motor control enable/disable
Motor rpm setpoint	4 (float)	0x0015	Motor setpoint rpm
TCU control	1 (uint8)	0x0019	TCU control enable/disable
TCU setpoint	4 (float)	0x001A	TCU temperature setpoint (°C)
TCU upper limit set	4 (float)	0x001E	TCU upper limit set (°C)
TCU lower limit set	4 (float)	0x0022	TCU lower limit set (°C)
Fill pinch valve control	1 Byte	0x0026	Disable/enable pinch valve (0/1)
Harvest pinch valve control	1 Byte	0x0027	Disable/enable pinch valve (0/1)

4

Wiring connection ports

Table 4.1. Wiring for Pump/Aux Out 4-20 mA ports.

Item		Cat. no.
Auxiliary output 4-20 mA cable		SV51142.01
Wiring		
	2 Wire	3 Wire
Pin 1	LOOP+	Transmitter supply input
Pin 2	NC	Return ground
Pin 3	LOOP–	4-20 mA Current output
Pin 4	NC	24VDC supply

Table 4.2. Wiring for external E-Stop port.

Item		Cat. no.
External E-Stop cable		SV51142.02
Wiring		
Pin 1		VDC+
Pin 2		Trigger signal
Pin 3		Trigger signal
Pin 4		VDC+

Table 4.3. Wiring for Legacy port.

Item	Cat. no.		
Legacy 17 pin cable	SV51142.04		
Wiring			
Legacy port pin	Cable color	Hardware function	IC79 DAC8168IAPW
Pin 1	BN	E-Stop	
Pin 2	BU	4-20 mA Output 1	RTD sensor 1
Pin 3	WH	E-Stop return	
Pin 4	GN	Alarm 1	
Pin 5	PK	4-20 mA Output 5	Motor set point
Pin 6	YE	Alarm return	
Pin 7	BK	4-20 mA Output 6	Motor speed
Pin 8	GY	4-20 mA Output 2	RTD sensor 2
Pin 9	RD	4-20 mA In/Out return	
Pin 10	VT	4-20 mA Output 3	Bag pressure sensor
Pin 11	GY/PK	4-20 mA Input 2	
Pin 12	RD/BU	4-20 mA Input 1	
Pin 13	WH/GN	Alarm 2	
Pin 14	BN/GN	Alarm return	
Pin 15	WH/YE	4-20 mA Output 4	
Pin 16	YE/BN	4-20 mA In/Out return	
Pin 17	WH/GY	4-20 mA In/Out return	

Table 4.4. Wiring for Alarm port.

Item	Cat. no.
External alarm cable	SV51142.03
Wiring	
Pin 1	Relay switch common
Pin 2	Relay switch common
Pin 3	Relay switch N.O.
Pin 4	Relay switch N.O.

Table 4.5. Wiring for Conductivity ports.

Item	Cat. no.
Conductivity sensor with VarioPin connector cable	SV51142.500
Conductivity sensor with M12 connector cable	SV51142.501
Wiring	
Pin 1	COND+
Pin 2	COND–
Pin 3	NC
Pin 4	NC
Pin 5	SHIELD

Table 4.6. Wiring for Modbus TCP port.

Item	Cat. no.
Modbus TCP cable	SV51142.100
Wiring	
Pin 1	Tx+
Pin 2	Rx+
Pin 3	Tx–
Pin 4	Rx–

Table 4.7. Wiring for TCU port.

Item	Cat. no.
Touchscreen Console to TCU (Lauda) cable	SV51142.101
Touchscreen Console to TCU (Neslab) cable	SV51142.102
Wiring	
Pin 1	NC
Pin 2	A
Pin 3	GND
Pin 4	B
Pin 5	GND

Table 4.8. Wiring for pH ports.

Item	Cat. no.
pH for K8S connector cable	SV51142.400
pH for VP connector cable	SV51142.401
Wiring	
Pin 1	COMMON
Pin 2	COMMON
Pin 3	COMMON
Pin 4	PH SIGNAL

Table 4.9. Wiring for PROFIBUS port.

Item	Cat. no.
PROFIBUS cable	SV51142.103
Wiring	
Pin 1	5VDC
Pin 2	DATA–(A-line)
Pin 3	GND
Pin 4	DATA–(B-line)
Pin 5	NC

Table 4.10. Wiring for RS485 and Modbus RTU ports.

Item	Cat. no.
RS485/Modbus RTU cable	SV51142.104
Wiring	
Pin 1	NC
Pin 2	NC
Pin 3	GND
Pin 4	A
Pin 5	B

Table 4.11. Wiring for CAN Bus port.

Item	Cat. no.
CAN Bus cable	SV51142.106
Wiring	
Pin 1	GND
Pin 2	NC
Pin 3	GND
Pin 4	CAN H
Pin 5	CAN L

Table 4.12. Wiring for RTD ports.

Item	Cat. no.
Single RTD cable	SV51142.200
Dual RTD Lemo connector (for Lauda TCU) cable	SV51142.201
Dual RTD DB9 connector (for Neslab TCU) cable	SV51142.202
Wiring	
Pin 1	RTD+
Pin 2	RTD–
Pin 3	COMMON
Pin 4	NC

Table 4.13. Wiring for Pressure Sensor port.

Item	Cat. no.
Pressure sensor cable	SV51142.300
Wiring	
Pin 1	SIGNAL+
Pin 2	EXCITATION–
Pin 3	SIGNAL–
Pin 4	EXCITATION+
Pin 5	SHIELD

Table 4.14. Wiring for DC motor port.

Item	Cat. no.
DC motor D-SUB, comm, and power cable	SV51142.600
Wiring	
Pin 1	CAN RET
Pin 2	STO CTRL
Pin 3	NC
Pin 4	24VDC GND
Pin 5	24VDC
Pin 6	CAN L
Pin 7	CAN H
Pin 8	STO FB
Pin A1	PE
Pin A2	48VDC GND
Pin A3	48VDC

Table 4.15. Wiring for Aux In 4-20 mA port.

Item		Cat. no.
Auxiliary output 4-20 mA cable		SV51142.01
	Wiring	
	2 Wire	3 Wire
Pin 1	NC	NC
Pin 2	NC	GND
Pin 3	LOOP–	4-20 mA Current input
Pin 4	LOOP+	24VDC supply

Table 4.16. Wiring for Pinch Valve ports.

Item	Cat. no.
Pinch valve cables	N/A
Wiring	
Pin 1	NC
Pin 2	GND
Pin 3	3.968VDC
Pin 4	SIGNAL OUTPUT

Table 4.17. Wiring for Load Cell ports.

Item	Cat. no.
Load cell cable	N/A
Wiring	
Pin 1	SIGNAL–
Pin 2	EXCITATION+
Pin 3	SENSE+
Pin 4	SIGNAL+
Pin 5	EXCITATION–
Pin 6	SENSE–
Pin 7	SHIELD
Pin 8	NC

Table 4.18. Wiring for AC Input port.

Item	Cat. no.
AC input power cable	--
C EURO 16A C19-5M	SV51142.700
AUS NZL 15A C19-5M	SV51142.701
GBR 13A C19-5M	SV51142.702
S AFRICA 16A C19-5M	SV51142.703
BRAZIL 16A C19-5M	SV51142.704
ITALY 16A C19-5M	SV51142.705
CHINA 16A C19-5M	SV51142.706
SWITZ 16A C19-5M	SV51142.707
ARG 16A C19-5M	SV51142.708
ISRAEL 16A C19-5M	SV51142.709
INDIA 16A C19-5M	SV51142.710
USA 240VAC 15A C19-5M	SV51142.711
USA 120VAC 20A C19-5M	SV51142.720
JAPAN 20A C19-5M	SV51142.721
Wiring	
Pin 1	LINE 1
Pin 2	LINE 2/NEUTRAL
Pin 3	PE

Table 4.19. Wiring for AC Output port.

Item	Cat. no.
AC output power cable	SV51142.800
Wiring	
Pin 1	LINE 1
Pin 2	NC
Pin 3	LINE 2/NEUTRAL
Pin 4	PE

Table 4.20. Wiring for AC Motor Module Motor port.

Item	Cat. no.
AC motor cable	SV50986.10
Wiring	
Pin 1	T1
Pin 2	T2
Pin 3	T3
Pin 4	NC
Pin 5	NC
Pin 6	PE

Table 4.21. Wiring for AC Motor Module Communication port.

Item	Cat. no.
Communication cable	SV51143.06
Wiring	
Pin 1	CAN GND
Pin 2	STO CTRL
Pin 3	NC
Pin 4	DC GND
Pin 5	24VDC IN
Pin 6	CAN L
Pin 7	CAN H
Pin 8	STO FB

Table 4.22. Wiring for AC Motor Module STO port.

Item	Cat. no.
STO cable	N/A
Wiring	
Pin 1	STO CAP
Pin 2	24VDC
Pin 3	NC
Pin 4	NC

Table 4.23. Wiring for AC Motor Module AC Power port.

Item	Cat. no.
AC Power cable	SV51143.04
Wiring	
Pin 1	L1
Pin 2	NC
Pin 3	L2/N
Pin 4	PE

5

Software integration

5.1 Loading VFD parameters for AC motors

The following instructions detail how to load VFD parameters for S.U.M. with Touchscreen Console systems that use AC motors.

1. Download the newest version of the Lenze™ EASY Starter software onto a laptop. The latest version can be accessed by opening the Home page of the Lenze website, selecting **Download** > **Software Downloads**, and selecting **EASY Starter** (Figure 5.1).

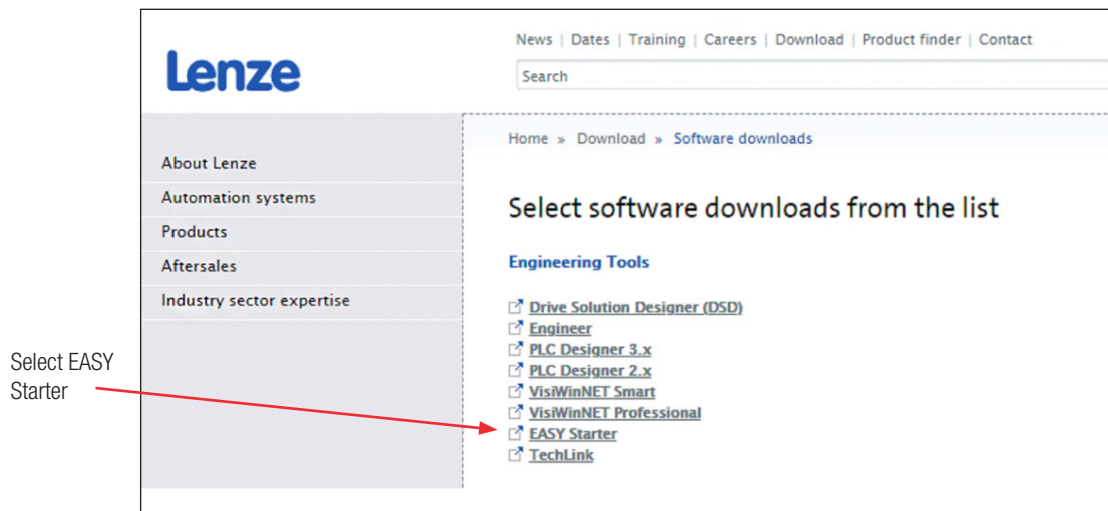


Figure 5.1. Accessing latest version of EASY Starter software.

1. Verify that the latest .gdc file is saved on the laptop by checking the REV# in the file name (e.g. i550_PARA_SV51166_REV1.gdc).
2. Turn on the Touchscreen Console power using the main disconnect on the back of the panel.

3. Turn on the VFD enclosure (AC motor module) power using the rocker switch on the side of the panel.
4. When prompted, push the blue reset button on the Touchscreen Console. Wait for both panels to fully power up.
5. The drive may show an error at this point, as shown by a flashing or solid red LED, as well as an error message on the keypad screen. Ignore this error for the time being.
6. Remove the keypad module from the front of the i550 drive and insert the USB module.
7. Connect the laptop to the USB module using a micro USB to USB A cordset.
8. Open the most current version of the Lenze EASY Starter software on the laptop.
 - a. The software will ask for which type of communication to use to talk to the drive. Select **USB—USB** and then click insert. The software should then find the drive and go to the main user page of the software.
 - b. In the main user page, click on the **Download** button in the top ribbon bar (Figure 5.2). A new window will come up—click the **Next** button, and then point to the most current .gdc file to load onto the drive.

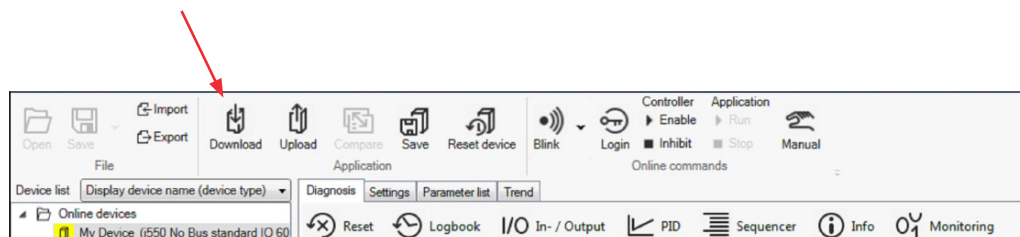


Figure 5.2. Location of the Download button.

- c. Click the **Start** button and the parameter file will download onto the drive.
- d. Click the **Save** button in the Lenze EASY Starter software located in the top ribbon bar (Figure 5.3).

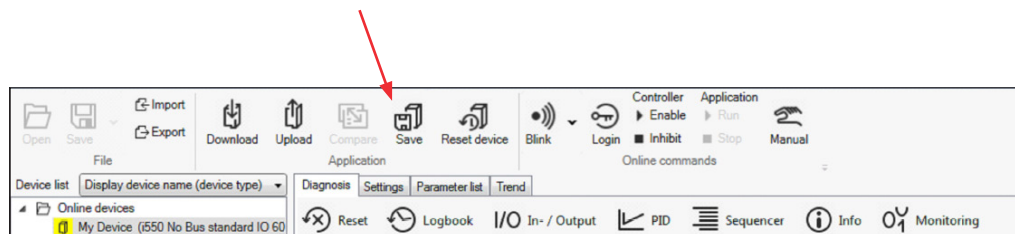


Figure 5.3. Location of the Save button.

- e. To clear the active error in the drive, go to the **Diagnosis** tab, then click the **Reset** button and the error will go away (Figure 5.4).

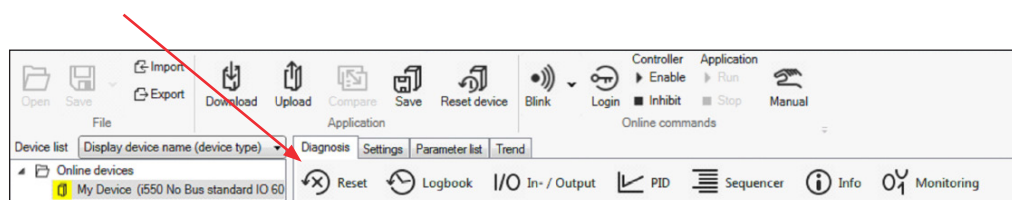


Figure 5.4. Reset button on the Diagnosis tab.

10. Replace the USB module with the keypad. The drive is now fully initialized.

5.2 Updating the firmware for all systems

The Touchscreen Console firmware is primarily updated via USB drive. To update the firmware, check the following link and compare the latest version against the version installed on the Touchscreen Console:

<https://www.thermofisher.com/us/en/home/technical-resources/software-downloads/hyperforma-single-use-mixer-touchscreen-console.html>

Click **Download** next to the latest version on the website (Figure 5.5) and follow the prompts to download the firmware to a USB drive.

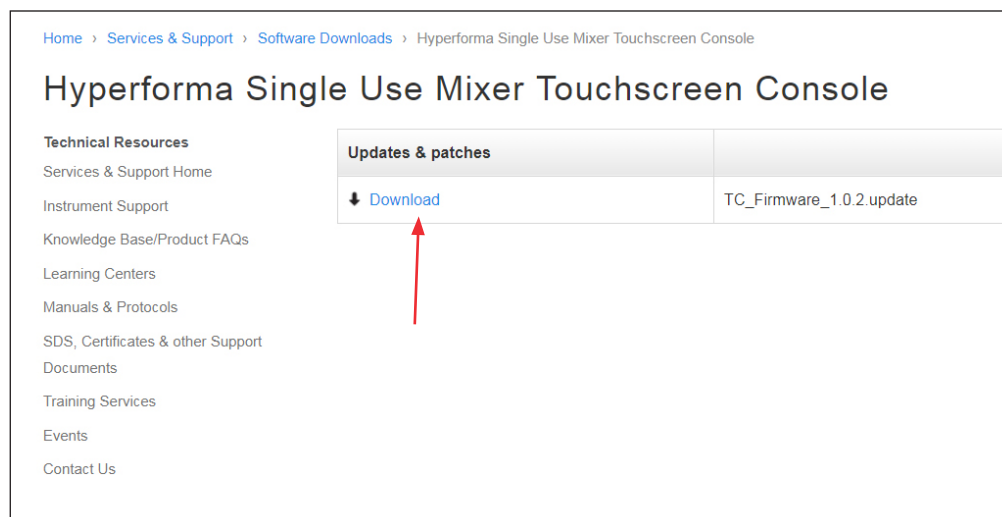


Figure 5.5. Firmware update download link.

When updating the firmware, insert the USB drive into the port on the back of the Touchscreen Console and ensure that the Administrator is currently logged in. Touch the **Settings** icon on the home screen. **Select Maintenance and Services**, and then **Check for Updates**. Follow the prompts to finish updating the firmware.

6

Schematic diagrams

6.1 AC motor module schematic block diagram and notes

Figure 6.1 shows the schematic block diagram for the Touchscreen Console AC motor module.

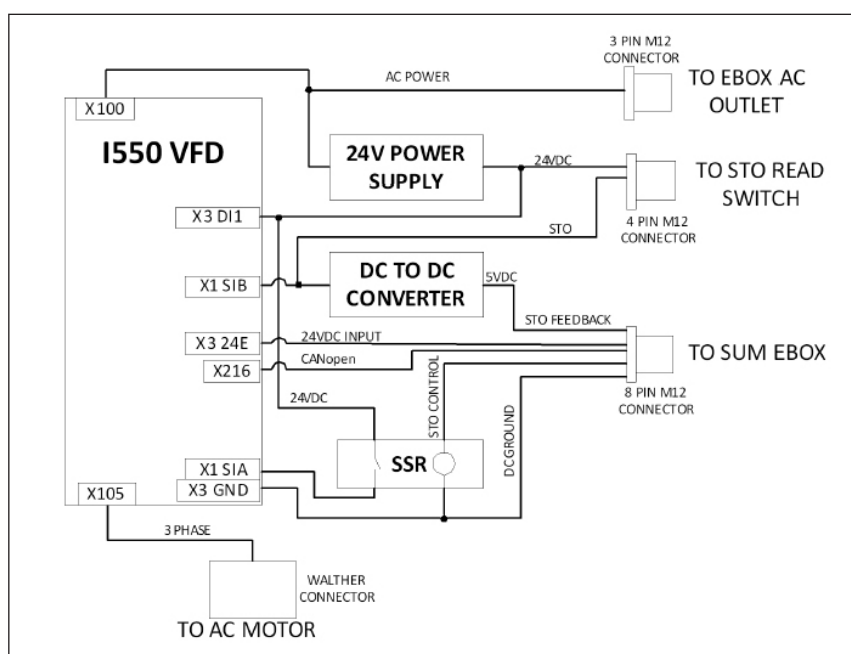


Figure 6.1. Schematic block diagram for AC motor module.

AC motor module schematic notes:

- Crimp the connectors using an industry standard, controlled-cycle ratcheting mechanism crimp tool designed specifically for the connector being used to ensure consistency.
- Crimp the ferrules on the end of all wires using an industry standard, controlled-cycle ratcheting mechanism. Use appropriately-gauged ferrules on the ends of each wire. Ferrules are not applicable on wires with a connector.
- Re-crimp the connectors using an industry standard, controlled-cycle ratcheting mechanism.
- Label both ends of each wire with the designated 4-digit wire number.
- To connect 120 OHM resistor: crimp one end of resistor, along with wire end of 1920, into one wire ferrule. Heat the shrink resistor, leaving 1/4 in. uncovered on non-connected lead. Crimp the other end of the resistor, along with the wire end of 1910, into another wire ferrule.
- Use cable ties to control wire routing.
- General wiring requirements:
 - Preferred wire type = MTW, alternative type = THHN/TFFN
 - No 90° bends. Do not exceed the minimum bend radius for the respective wire type.
 - Cut wires to minimum necessary length.
 - Ensure the enclosure is free of dust and debris.

6.2 Touchscreen Console electrical block diagram

Figure 6.2 on the following page shows the electrical block diagram for the Touchscreen Console.

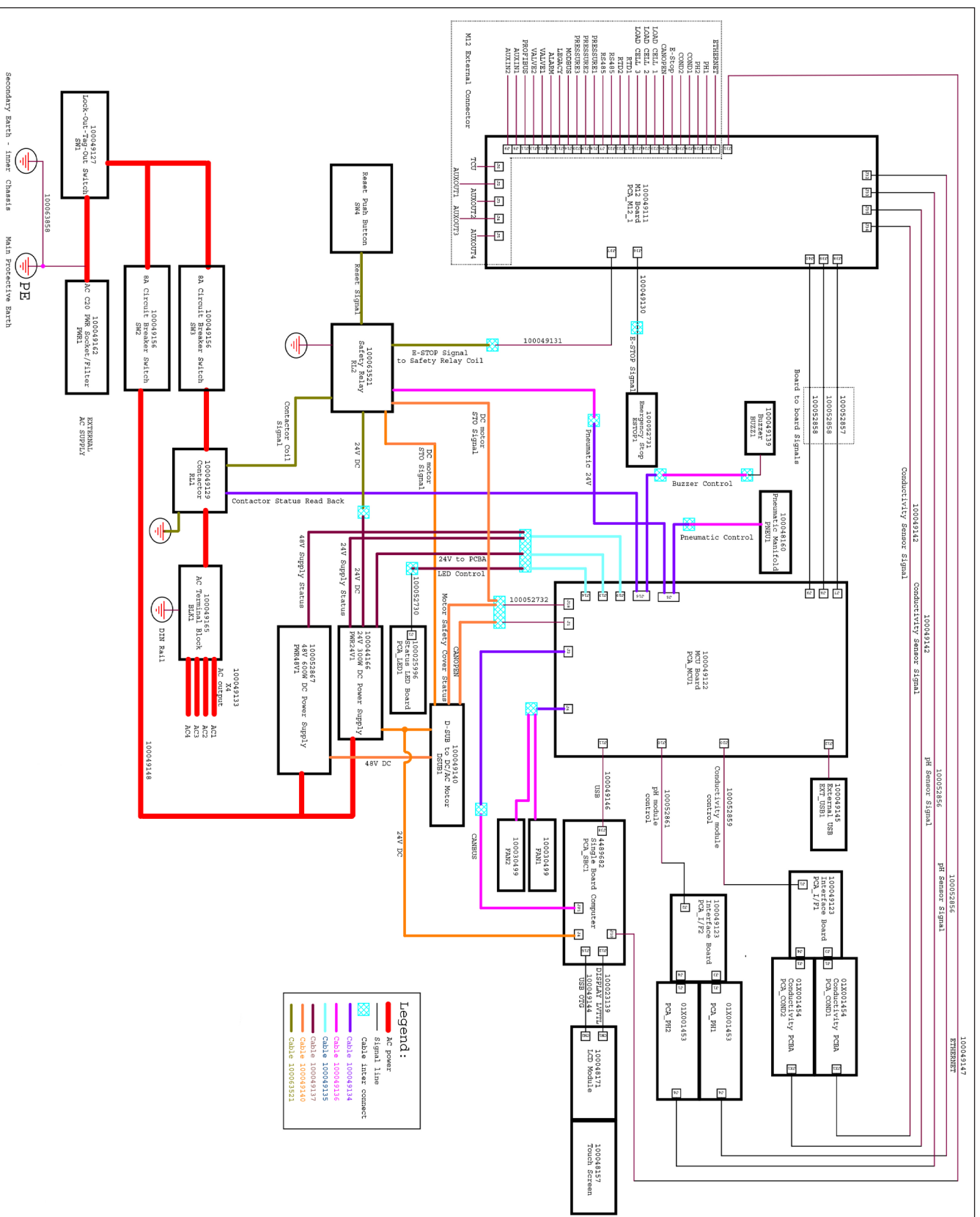


Figure 6.2. Electrical block diagram.

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