APPLIANCE AND LIGHTING

Hybrid Electric Water Heater

Test System Assembly Specification

Rev. 2

JOHN CONWAY
5/19/2011

Revision History

Revision	Date	Notes
0	9/1/2010	Original
1	9/7/2010	Updated Channel Config Chart, Added Items 44,45 to TCB BOM, Updated Schematics, added p4 to schematics, Revision Section
2	5/19/2011	Updated drawings, bom, for 2011.

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Drawing 5 Panel Connector 5 Pin
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1. Overview

The Hybrid Electric Water Heater (HEWH) will be tested according to the Department of Energy "APPENDIX E TO SUBPART B OF PART 430—UNIFORM TEST METHOD FOR MEASURING THE ENERGY CONSUMPTION OF WATER HEATERS."

To comply with this test methodology, a test system shall be employed composed of several elements. A plumbing, water supply, electrical supply, and environmental control chambers shall be employed. A Test Control Box (TCB) shall be mounted on the outside of the environmental control cambers. The TCB shall contain the computer and data acquisition and control equipment to run the test. This box shall be wired to the control elements and sensors on the outside of the chamber, and also wired to a Patch Panel Box (PPB) mounted inside the environmental control chamber. The PPB will have the connectors that will go to the sensors on the Hybrid Electric Water Heater.

This document will describe the configuration of the Test Control Box, and the Patch Panel Box.

2. Test Control Box (TCB)

Note items are noted with curly brackets{*N*} The number *N* is noted in the Ref column of the BOM.

2.1. Equipment

The Test Control Box (TCB) shall have a fanless industrial computer{34} mounted to the door. This computer shall run a program to interface to a Yokogawa MW100 data acquisition system{11-17}, an Agilent 34972A{18,19}, and a USB to serial port converted{2}. These pieces of equipment shall be connected through an industrial Ethernet switch{1}.

2.1.1. Yokogawa MW100 Configuration

The Yokogawa MW100 will have a 6 slotted back plane. The cards shall be mounted in the following order:

Slot 0	Analog output 8 Channel MX120-VAO-M08
Slot 1	Analog Input 10 Channel MX110-UNV-M10
Slot 2	Analog Input 10 Channel MX110-UNV-M10
Slot 3	Analog (RTD) Input 6 Channel MX110-V4R-M06
Slot 4	Discrete Output 10 Channel MX110-UNV-M10
Slot 5	Empty

2.1.2. Channel Configuration

The channel connections shall be according to the following table.

Channel	Description	Signal
001	Flow Control Intellifacet	4-20 MA
011	Pressure - High Side 1	1-5V
012	Pressure - High Side 2	1-5V
013	Pressure - Low Side	1-5V
014	Pressure - Pinput	1-5V
015	Current - 20A Top Heater	DI 240 VAC Relay
016	Current - 20A Bot Heater	DI 240 VAC Relay
017	Temp Shell 2-4	Thermocouple - T
018	Flow	0-10V
019	Watt Sense	0-5V
020	Watt Tick	Contact
021 - 026	Temp Tank Tree	Thermocouple - T
027	Temp Downspout	Thermocouple - T
028-030	Temp Shell 2-4	Thermocouple - T
031	Temp RTD Tin	4 wire RTD
032	Temp RTD Tout	4 wire RTD
033	Temp RTD Tamb	4 wire RTD
034	Voltage	0-10V
041	Temp/Flow DO to intellifaucet	Contact
042	Ready DO to intellifaucet	Contact
043	Start to intellifaucet	Contact
044	Stop to Intellifaucet	Contact
045	Pin 2 - DRM 1 (input Low Bit)	Contact

046	Pin 3- DRM 0 (input High Bit)	Contact
047	Water Heater Power	240 VAC Contactor
048	Solenoid Purge	120 VAC Relay
049	Solenoid Fill tank	120 VAC Relay
050	Solenoid Tank Output	120 VAC Relay
Agilent 101-104	Temp Xtra (4)	Thermocouple - T
Agilent 105-109	Temp Evaporator (5)	Thermocouple - T
Agilent 110-114	Temp Dry/wet bulb (4)	Thermocouple - T
Agilent 201-205	Temp Controls Trise (5)	Thermocouple - T
Agilent 206-211	Temp shadow T1-T5 (6)	Thermocouple - T
Agilent 212-214	Temp Tsuction, Tdis, Tret (3)	Thermocouple - T
Agilent 301-311	Temp Tcondenser (12)	Thermocouple - T

Figure 1 Channel Configuration

The analog signals shall be carried in individually shielded twisted pairs. An extra terminal connection will be provided so that the field wiring shield can be terminated. These analog shields shall be connected at the terminal to the DC ground net, which is connected to the negative terminal of the 24 VDC supply{38}, not earth ground.

2.2. Bill of Materials

The items in the following table shall be included. They are referred to through section 2 of this document, in the {}'s. Unless noted as "supplied by GE," the items from the Bill of Materials will have to be acquired by the vendor. Items with "or equivalent" noted can be substituted upon approval by GE.

Test Control Box							
1	1	Ethernet Isolated Din Switch			B&B	EIR308	
2	1	USB TO ISOLATED Serial 4 prt RS232 W/DB9M			B&B	USO9ML2-4P	
3	1	Main Test Enclosure	Hoffman	CSD302410	CED	CSD302412	
4	1	Mounting Plate	Hoffman	CP30P24	CED	CP3024	
5	1	Mounting Kits	Hoffman	CMFK	CED	CMFK	
6	1	USB A Bulkhead	DataPro	1598-02C	DataPro	1598-02C	
7	1	HD15 Bulkhead VGA Panel-Mount Ext CL2 PVC 2 ft	Data Pro	1152-02C	DataPro	1152-02C	
8	1	VGA & USB Wall Plate	DataPro	70302A	DataPro	70302A	
9	1	Relay/Contactor	McMaster Carr	70255K342	McMaster Carr	70255K342	or equivolent
10	10	Liquid Tight 1" Conduit Adaptor	-	-	McMaster Carr	75145K55	or equivolent
11	1	DAQ: Main Module (with MW100 Viewer Software), Math Function.	Yokogawa	MW100-E-1D	Measurement Instruments	MW100-E-1D	Supplied by GE
12	1	DAQ: Base plate for one main and six I/O modules $	Yokogawa	MX150-6	Measurement Instruments	MX150-6	Supplied by GE
13	1	DAQ: 10 ch 100 msec Form A contact relay	Yokogawa	MX125-MKC-M10	Measurement Instruments	MX125-MKC-M10	Supplied by GE
14	1	DAQ:10 ch/100msec, DCV/TC/RTD/DI analog input module	Yokogawa	MX110-UNV-M10	Measurement Instruments	MX110-UNV-M10	Supplied by GE
15	1	DAQ:10 ch/100msec, DCV/TC/RTD/DI analog input module	Yokogawa	MX110-UNV-M10	Measurement Instruments	MX110-UNV-M10	Supplied by GE
16	1	DAQ:6 channels/100msec, 4-wire RTD, resistance, DCV and DI	Yokogawa	MX110-V4R-M06	Measurement Instruments	MX110-V4R-M06	Supplied by GE
17	1	DAQ:8 ch 100msec 1 to 5V & 4 to 20mA output	Yokogawa	MX120-VAO-M08	Measurement Instruments	MX120-VAO-M08	Supplied by GE
18	1	Thermal Data Acquisition	Agilent	34972A	Newark	55R0480	Supplied by GE
19	3	Thermocouple Input Cards	Agilent	34902A	Newark	83F4191	Supplied by GE
20	2	Resistor 250 ohm, 1% Tc = 50 ppm	Vishay	R60C2500BB14	Newark	83F1584	
21	1	4 Position Modular Relay Board	Tyco/PB	2IO4A	Newark	81F4505	or equivolent
22	4	24 input 120 output relay	Tyco/PB	OAC24A	Newark	18M9254	or equivolent
23	4	Toggle switches	Honeywell	11TS15-1	Newark	23F2113	or equivolent
24	1	Cap for RJ45 pass through			Newark	15M3585	or equivolent
25	1	RJ45 pass through connector	Daniel Woodhead	ENSP1F5	Newark	15M0234	or equivolent
26	1	Cap for RJ45 pass through	Daniel Woodhead	67-0300	Newark	15M3585	or equivolent
27	1	2 Pole 32 A, 480 V circuit breaker			Newark	86K9999	or equivolent

Any PC ok

28	1	1 Pole 10 A, 277 V circuit breaker			Newark	32M7843	or equivolent
29	1	4PDT Relay for Manual Overide	TYCO / POTTER & BRUM	KHAU-17A11N-120	Newark	87F1106	or equivolent
30	1	Din rail mount relay socket	TYCO / POTTER & BRUM	27E894	Newark	46F3589	or equivolent
31	1	Power Strip	TRIPP LITE	6SP	Newark	87F2854	or equivolent
32	1	LED 120 VAC overide indicator			Newark	79M6920	or equivolent
33	1	E-Stop Button	IDEC	AVW401-R	Newark	74K3690	or equivolent
34	1	Industrial Computer	Rave Computer	R-SFF-C2D-1			Not available
34A	1		Superlogics	See PCs Spreadsheet			Substitute
35	1	Ventilation Fan	NMB-MAT	4715MS-12T-B50-A00	Newark	70K9511	or equivolent
36	2	Finger Guard	NMB-MAT	055015	Newark	93K7618	or equivolent
37	1	Fan Power Chord	NMB-MAT	432000	Newark	93K7643	or equivolent
38	1	SPDT 120VAC 10 A relay	TYCO/PB	KUP-5A15-120	Newark	18M9148	or equivolent
39	1	Relay Base	TYCO/PB	27E893	Newark	46F3616	or equivolent
40	1	24 VDC 100W din power supply	24 VDC 100 W Din Power Supply		Newark	73K6073	
41	1	120 VAC Plug			McMaster Carr	7196K31	or equivolent
42	1	250 VAC 30 A Plug 3 terminal NEMA 90 degree			McMaster Carr	8035K55	or equivolent
43	1	Watt-Hour Sensor			Ohio Semitronics	W-119CX5	Supplied by GE
44	1	RJ45 Breakout Box	EMERSON	32-2038	32-2038	Master Distributors	
45	1	USB-150: Full Speed USB Isolator	Keterex	USB-150	Keterex	USB-150	
46	1	ACER V173 DJB 17" Monitor	ACER	V173 DJB 17"	CDW	2091793	
47	1	USB Keyboard	Keytronic	Mfg#: KT400U2	CDW	1378635	
48	1	IOGEAR 4PT USB 2.0 HUB	IOGEAR	Mfg#: IOR-GUH285	CDW	1571452	
49	1	Optical Mouse	Kensington	Mfg#: KEN-K72356US	CDW	1909960	
50	1	FAN FILTER STARTECH| FANFILTER12 RT			NewEgg	11-993-011	
53	1	Voltage Transducer			Ohio Semitronics	VTR-002D	salvaged from old equipment
54	1	Cat 5e Patch Chord 1'			Newark	21M5869	
55	3	Cat 5e Patch Chord 5'			Newark	21M5656	
56	30	Through Hole Cable Mounts	SPC	VRTH-05	Newark	81N2595	Or Equiv. (Use as needed)

Mondohub

Figure 2 Bill of Material for the TCB

2.3. External Connections

The output of the computer will consist of external connections to a VGA monitor output, and a USB connection for mouse and keyboard. These will be wired to ports on the outside of the TCB{6-8}. There shall also be a port from the Ethernet switch porting to the outside of the box for networking{25}.

The 120 VAC and 240 VAC supply lines shall have chord grips, attaching 3 feet of wire the their associated plugs {41,42}. The 240 VAC line shall be 3 conductor #8AWG wire.

2.3.1 Terminals for External Sensors

Terminal Blocks shall be clearly labeled, indicating the electrical node that is connected. Terminals shall be left explicitly intended for external sensors. A terminal for each of the entries shall be indicated, and clearly labeled. The external sensor block requirements are in the following chart:

Terminal Block Wire Labels		
Type	Intended Field Wire	Terminals
Pressure(x4)	Shielded 2x twisted pairs	POWER
	(24-18 AWG)	P_GND
		SIG
		S_GND
		Shield
Heaters(x2)	Twisted Pair	+
	(16-22AWG)	-
RTD_Temp(3)	Shielded 2x twisted pairs	RTD_I
	(24-18 AWG)	RTD_A
		RTD_B
		RTD_C
HEWH Power Output(1)	AWG8/10 x 3	240 L1
		240 L2
		EGND
Intellifaucet(1)	Shielded Multiconductor	A:4-20+
	(AWG 24-18)	B:4-20-
		C:Start
		D:Stop
		E:DGND
		F:Ready
		G:Temp/Flow
Solenoids(3)	Twisted Pairs	120 L
	(14-18 AWG)	120 N
		EGND
DRM	Multiconductor	DRM_0:PIN2
	(AWG 24-18)	DRM_REF:PIN6
		DRM_1:PIN3
Tc_Temp(up to 59)	T Thermocouple Wire	No terminals for wiring. Attach directly to daq terminals

Figure 3 Terminal Block Wiring

2.4. Power

The power to the box shall be 120 VAC for the test system, and 240 VAC for the HEWH. All of the current carrying wires for the 240VAC system will be AWG #8 to minimize measurement losses due to wire resistance. Both the 120 VAC and both legs of the 240VAC lines shall be protected by circuit breakers{27-28}. An emergency stop button{33} wiring through a relay{38,39} will be wired to disconnect the 120 VAC power for the system. One of the outputs of the MW100 will be used to trigger a contactor{9} that will allow 240 VAC power to flow to the water heater. This power going to the water heater will be monitored by an Ohio Semitronics Watt-Hour sensor{43}.

The power wiring should be segregated as much as possible from the sensor and control wiring.

3. Patch Panel Box (PPB)

The Test Control Box will be mounted on the outside of the chamber and have several conduit exits the will connect to the Patch Panel Box(PPB) mounted on the inside of the test chamber. The PPB will have the connectors to interface to the sensors employed in the test.

Each of the connector pins for the sensors will prewired to a termination block inside of the enclosure. These sensors include:

1. 48 Thermocouples (T)
2. 3 Pressure sensors (4 Wires)
3. 3 RTDs (5 Wires)
4. 1 Gas (6 wires)
5. 4 Serial Ports (6 wires)
6. 1 Spare (6 wires)

3.1 Pin Outs

The sensor wiring should all be done with shielded cable. The shield should be wired into one of the terminals. RTDs are wired into 5 terminal connections, Pressure Sensors are wired into 3 terminal connections, and Serial/Gas/Spare connections are wired into 6 pin connections.

The pinouts for the sensors should follow the following Chart:

Pin	Pressure Sensor	RTD	Serial	Gas
1	+V	I	RXD	+V
2	Sense	+/A	TXD	+Sense
3	DC_GND	-/B	GND	-Sense
4	Shield	C	Shield	DC_GND
5	NA	Shield	No Con	Shield
6	NA	NA	No Con	No Con

Figure 4 Sensor Pin Out

Note that none of the shields are grounded in this box. The shields are to be grounded in the TCB. Terminals for the shields are to be provided in this box, and field wired back to the TCB.

The thermocouples will be left unconnected, to be attached during installation.

3.2 Heater Relay Inputs

External connections to the water heater to detect the state of the heating elements shall be made through turnlock connections {3,4}rated to 240 VAC. These connections shall then be wired to a solid state relay {15,16} that will be wired back to the TCB. The solid state relays shall bring the signal power down from 240 VAC to 24 VDC. Provisions for 3 of these inputs shall be made on the control box.

3.3 Bill of Material

Patch Panel Box							
1	1	Enclosure for sensor interface			CED	CSD241668	
2	1	Mounging Plate			CED	CP2416	
3	1	Mounting Kits			CED	CMFK	Mounting Hardware
4	3	Female Mini Turnlock for heater 240 VAC	McMaster Carr	6755K21	McMaster Carr	6755K21	140F max operating/185F for metal version
5	3	Male Mini Turnlock Recept. 240 VAC	McMaster Carr	6755K22	McMaster Carr	6755K22	
6	3	Thermocouple Jack Panel	Omega	SJP3-18-T	Omega	SJP3-18-T	
7	3	5 PIN FEMALE PANEL MOUNT, SLIVER CONTACT, ZINC BODY			Newark	87F6603	Not available
7A			Multicomp/SPC	SPC21423	Newark	11M0618	Substitue
7B			Neutrik	NC5FP-B-1	Newark	27B4347	Not available
8	3	4 PIN FEMALE PANEL MOUNT, SLIVER CONTACT, ZINC BODY			Newark	46F8566	
9	3	4 PIN MALE CONNECTOR, SLIVER CONTACT, ZINC BODY			Newark	89F6044	
10	3	5 PIN MALE CONNECTOR, SLIVER CONTACT, ZINC BODY			Newark	89F6045	
10A	3		Multicomp/SPC	SPC21436	Newark	11M0631	Substitue
11	4	6 PIN FEMALE PANEL MOUNT, SLIVER CONTACT, ZINC BODY			Newark	87F6605	
12	4	6 PIN MALE CONNECTOR, SLIVER CONTACT, ZINC BODY			Newark	89F6046	
13	1	RJ45 pass through connector	Daniel Woodhead	ENSP1F5	Newark	15M0234	or equivolent
14	1	Cap for RJ45 pass through	Daniel Woodhead	67-0300	Newark	15M3585	or equivolent
15	2	240 VAC in, conf 367065, 24 VDC out relay	OPTO22	IAC-24A	Newark	18M9104	
15A	2		NTE	RIM-IAC24A	Newark	02H6945	Substitute
16	1	4 Position Modular Relay Board	Tyco/PB	2IO4A	Newark	81F4505	
17	54	Thermocouple connectors	Omega	OSTW-CC-T-M	Omega		

Figure 5 Bill of Material for the PPB

4. Further Considerations

1. All internal wiring shall be cable tied using a screw secured cable tie holders.
2. The computer will be specified per ongoing tests.

WIRE 1: Belden 8723-060 2 Pr 22 AWG , externally shielded

WIRE 2, Belden 19503 B59 (BLKMTT) 3x AWG18

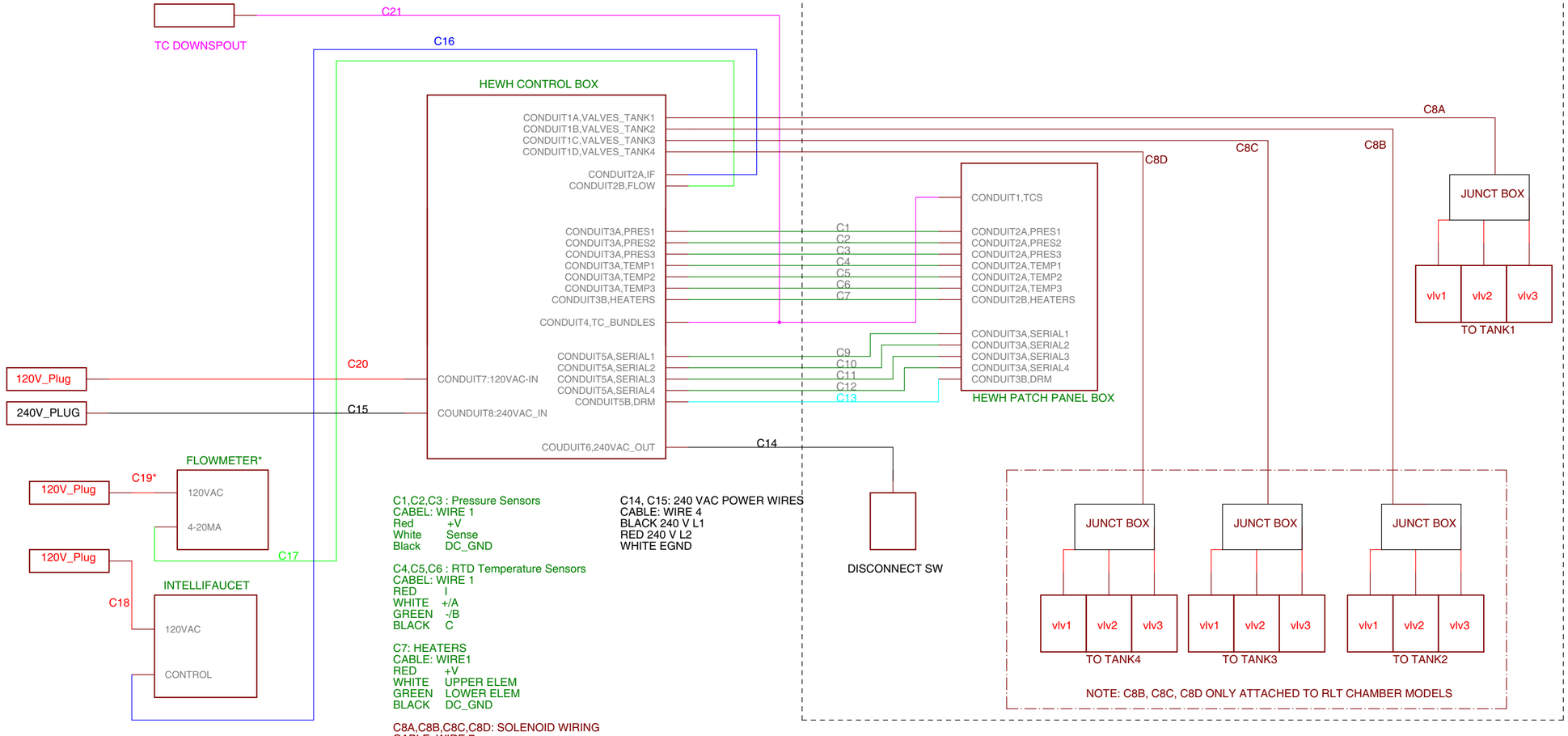
WIRE 3, Belden 8304 060100, 4 pr 22 awg, externally shielded

WIRE 4, McMaster Carr 8248K19 3xawg 10

WIRE 5, Cat 5E Cable Ethernet

WIRE 6, THERMOUCOUPLE WIRE TYPE T

WIRE 7, 18/5 McMaster Carr 9936K19



C1,C2,C3 : Pressure Sensors
CABEL: WIRE 1
Red +V
White Sense
Black DC_GND

C4,C5,C6 : RTD Temperature Sensors
CABEL: WIRE 1
RED I
WHITE +/A
GREEN -/B
BLACK C

C7: HEATERS
CABLE: WIRE1
RED +V
WHITE UPPER ELEM
GREEN LOWER ELEM
BLACK DC_GND

C8A,C8B,C8C,C8D: SOLENOID WIRING
CABLE: WIRE 7
BLACK1 VALVE IN
BLACK2 VALVE PURGE
BLACK3 VALVE OUT
BLACK4 NEUTRAL
GRN/YEL EGND

C9, C10, C11, C12: SERIAL WIRING
CABEL: WIRE 1
Red RXD
White TXD
Green DC_GND

C13 DRM CABLE
CABLE: WIRE 5
PIN5 (BLUE?) DRM1_LOW
PIN6 (BLUE/WHITE?) DRM0_HIGH
PIN8 (BROWN?) DRM_GND

C14, C15: 240 VAC POWER WIRES
CABLE: WIRE 4
BLACK 240 V L1
RED 240 V L2
WHITE EGND

C16 : INTELLIFAUCET CONTROL WIRE
A-4-20+ RED
B-4-20- BLK(RED)
C START OUT WHITE
D STOP OUT BLK(WHITE)
E DIG GND GREEN
F DATA READY BLK(GREEN)
G TEMP/FLOW BLUE
NC BLK(BLUE)

C17: FLOWMETER
CABLE: WIRE 1
MAG FLOWMETER
4:- MA WHITE
5: +MA GREEN
TURBINE FLOWMETER
1:+24vdc RED
2:DC GND BLACK
7: VOLTAGE OUTPUT, 0-10VDC GREEN
9: CIRCUIT COMMON WHITE

*NOTE: C19 INSTALLED ONLY FOR MAG FLOWMETER

C18,C19*,C20: 120VAC POWER
CABLE: WIRE 2
BROWN 120 V L1
BLUE 120 V N
GR/YEL EGND

C21
CABLE: WIRE 6
+T COPPER
-T CONSTANTAN

DWG.NO.	HEWH-CP2PP	GENERAL ELECTRIC
		REV. 3
TITLE:	HEWH-WIRING	PAGE: 1 OF 1
DATE:	12/02/2010	AUTH: JYC

THESE CONTROLS FOR TANK 2, TANK 3, AND TANK4 IS TO BE INSTALLED
FOR THE RLT CHAMBER CONTROL UNITS, ONLY

DC_GND

24 VDC

120 VAC L

120 VAC N

4IO-OAC

1:VDC 1:NC
2:GND1 2:L_IN1
3:IN1 3:L_OUT1
4:GND2 4:L_IN2
5:IN2 5:L_OUT2
6:GND3 6:L_IN3
7:IN3 7:L_OUT3
8:GND4 8:L_IN4
9:IN4 9:L_OUT4

{21}(1)

TB

MW100-DO10

CH 051 NO-CH1
COM-CH1
CH 052 NO-CH2
COM-CH2
CH 053 NO-CH3
COM-CH3
CH 054 NO-CH4
COM-CH4
CH 055 NO-CH5
COM-CH5
CH 056 NO-CH6
COM-CH6
CH 057 NO-CH7
COM-CH7
CH 058 NO-CH8
COM-CH8
CH 059 NO-CH9
COM-CH9
CH 060 NO-CH10
COM-CH10

4IO-OAC

1:VDC 1:NC
2:GND1 2:L_IN1
3:IN1 3:L_OUT1
4:GND2 4:L_IN2
5:IN2 5:L_OUT2
6:GND3 6:L_IN3
7:IN3 7:L_OUT3
8:GND4 8:L_IN4
9:IN4 9:L_OUT4

{21}(2)

4IO-OAC

1:VDC 1:NC
2:GND1 2:L_IN1
3:IN1 3:L_OUT1
4:GND2 4:L_IN2
5:IN2 5:L_OUT2
6:GND3 6:L_IN3
7:IN3 7:L_OUT3
8:GND4 8:L_IN4
9:IN4 9:L_OUT4

{21}(3)

C8B
SOL: 120_N
SOL:DRAIN_L
SOL:OUT_L
SOL:IN_L
TO TANK 2

C8C
SOL: 120_N
SOL:DRAIN_L
SOL:OUT_L
SOL:IN_L
TO TANK 3

C8D
SOL: 120_N
SOL:DRAIN_L
SOL:OUT_L
SOL:IN_L
TO TANK 4

DWG.NO. HEWH-CB1	GENERAL ELECTRIC
TITLE: HEWH - CONTROL BOX	REV. 0
	PAGE: 5 OF 5
DATE: 10/27/2010	AUTH: JYC

{35,37} FAN

120VAC_L

120VAC_N

120VAC_L

120VAC_N

EGND

BREAKOUT OF POWER STRIP PLUG

PS2 PS3 PS1

120VAC_L 120VAC_N 120VAC_GND

SOCKET1

SOCKET2

SOCKET3

SOCKET4

SOCKET5

SOCKET6

{31} POWER STRIP

{34} COMPUTER MOUNTED TO DOOR

120VAC

USB1

USB2

VGA

ETHERNET

USB

VGA

{6,7,8} PANNEL CONNECTION

{55}

24VDC

DCGND

24VDC PORT1

PORT2

DCGND PORT3

PORT4

PORT5

PORT6

PORT7

PORT8

{55}

{54}

{55}

{1} ETHERNET SWITCH

{44,45} PANNEL CONNECTION

ETHERNET 120VAC

{18} AGILENT 34972A

24VDC SERIAL1

DCGND SERIAL2

SERIAL3

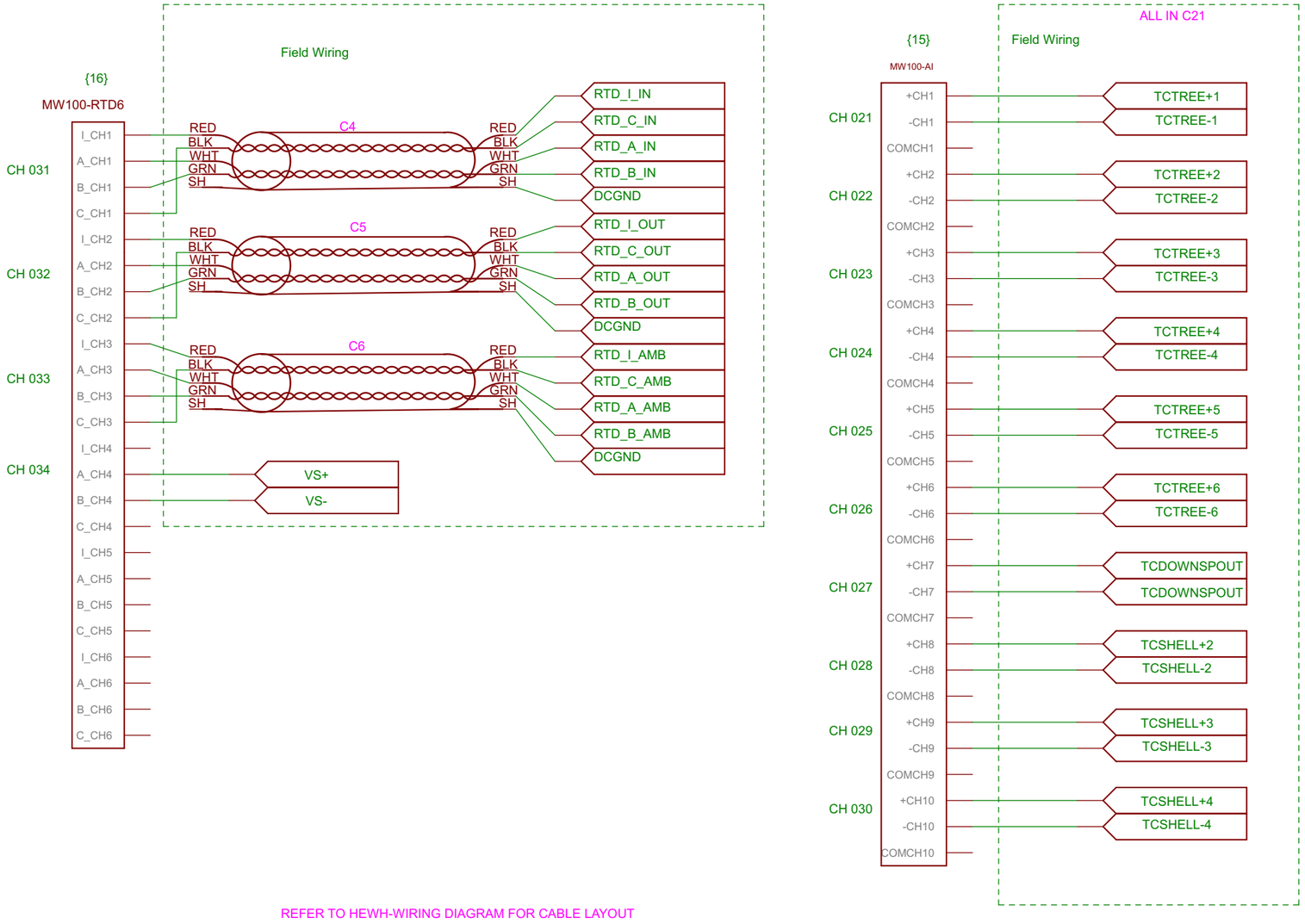
USB SERIAL4

{1} SERIAL USB ADAPTER

ETHERNET 120VAC

{11} MW100

DWG.NO. HEWH-CB1	GENERAL ELECTRIC
TITLE: HEWH - CONTROL BOX	REV. 2
	PAGE: 4 OF 5
DATE: 05/19/2011	AUTH: JYC



REFER TO HEWH-WIRING DIAGRAM FOR CABLE LAYOUT

DWG.NO. HEWH-CB1	GENERAL ELECTRIC
TITLE: HEWH - CONTROL BOX	REV. 2
	PAGE: 3 OF 5
DATE: 05/19/2011	AUTH: JYC

BOX WIRING

24 VDC
DC_GND
TERMINALS

TB

FIELD WIRING

EXTERNAL CONNECTIONS

{14}
MW100-AI

CH 011 +CH1 -CH1 COMCH1
CH 012 +CH2 -CH2 COMCH2
CH 013 +CH3 -CH3 COMCH3
CH 014 +CH4 -CH4 COMCH4
CH 015 +CH5 -CH5 COMCH5
CH 016 +CH6 -CH6 COMCH6
CH 017 +CH7 -CH7 COMCH7
CH 018 +CH8 -CH8 COMCH8
CH 019 +CH9 -CH9 COMCH9
CH 020 +CH10 -CH10 COMCH10

RED BLK SH

{20}R2
{20}R3
{20}R5
{20}R4
{20}R1

C1
RED BLK WHT GRN SH
PRES_HIGH1_POW
PRES_HIGH1_GND
PRES_HIGH1_SIG
PRES_HIGH1_GND1
PRES_HIGH1_SHIELD

C2
PRES_HIGH2_POW
PRES_HIGH2_GND
PRES_HIGH2_SIG
PRES_HIGH2_GND1
PRES_HIGH2_SHIELD

C3
PRES_LOW_POW
PRES_LOW_GND
PRES_LOW_SIG
PRES_LOW_GND1
PRES_LOW_SHIELD

NOT CONNECTED
PRES_H2O_POW
PRES_H2O_GND
PRES_H2O_SIG
PRES_H2O_GND1
PRES_H2O_SHIELD

C7
RELAY POWER
RELAY GND
HEATER1
HEATER2

C21
TSHELL+
TSHELL-

C17
GRN WH SH
+FLOW (5)
-FLOW (4)

* FLOWMETER WIRING SHOWN FOR MAG FLOWMETER
FOR TURBINE FLOWMETER
RED +24VDC(TERMINAL 1)
BLACK DC GND(TERMINAL 2)
GREEN VOLTAGE OUTPUT, 0-10VDC+(TERMINAL 7)
WHITE CIRCUIT COMMON(TERMINAL 9)

{27}
B1 T1
240AC
EGND
240AC_
240 VAC CHORD: C15

GND

{9}
TO HEWH DISCONNECT: C14

120VAC L
120VAC N
VS+
VS-

{53}
1:AC_IN1
2:AC_IN2
3:N
4:L
5:SENSE-
6:SENSE+

{43}
1 -WH
2 +WH
1A -W
2A +W
3 I_L1_IN
4 I_L1_O
5 V_L1
6 V_L2
7
8
9
10
11
12

V1 V2 PS9
POW_R1
POW_R2

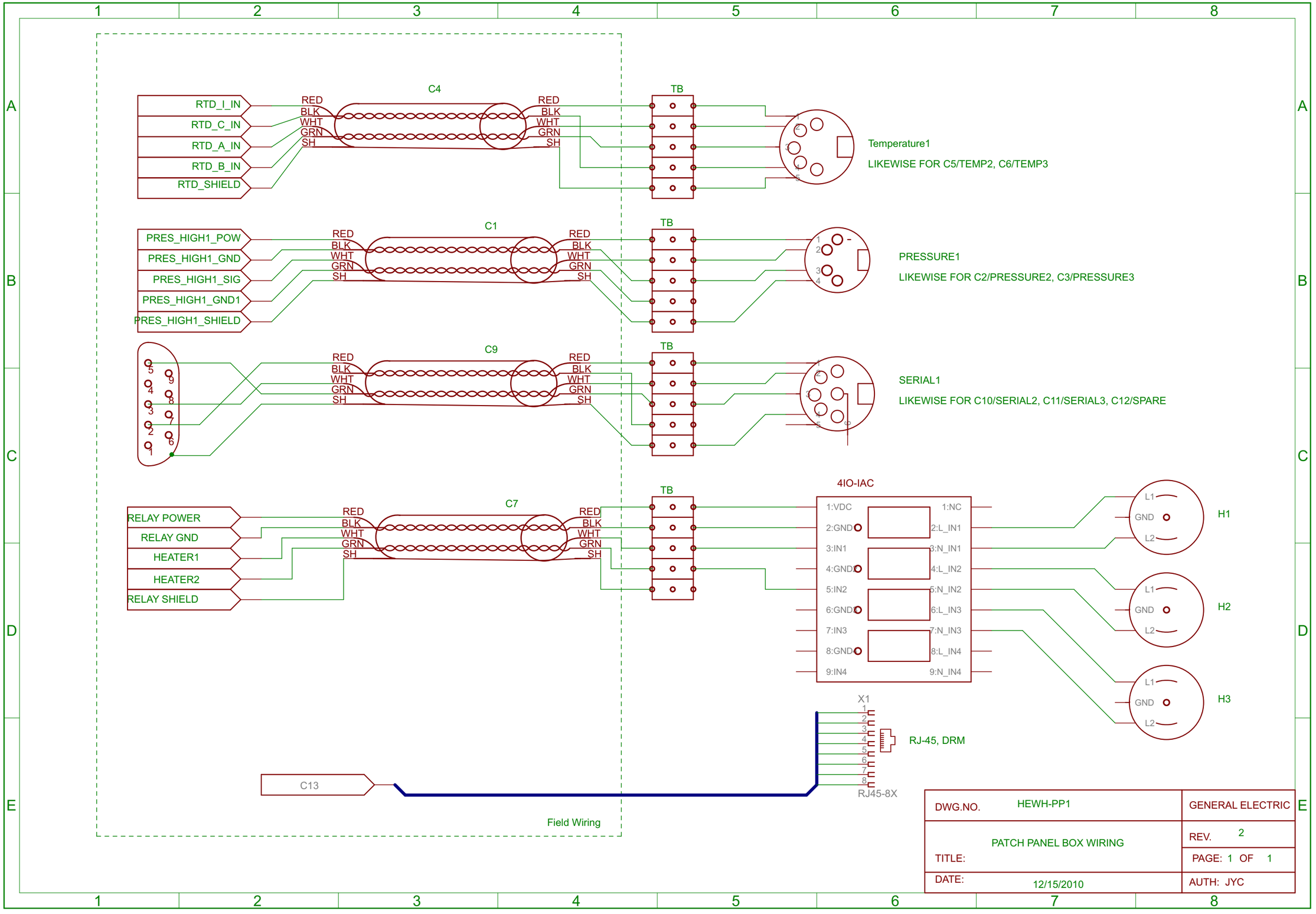
Current Carring 240 VAC wiring AWG #8

REFER TO HEWH-WIRING DIAGRAM FOR CABLE LAYOUT

DWG.NO. HEWH-CB1	GENERAL ELECTRIC
TITLE: HEWH - CONTROL BOX	REV. 5
	PAGE: 2 OF 5
DATE: 05/19/2011	AUTH: JYC

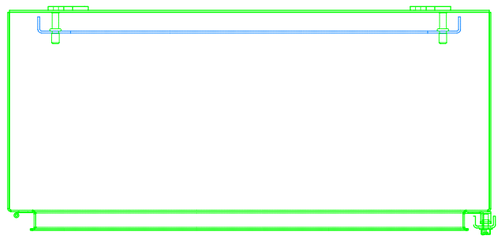
{17}
MW100_AO8
V+_CH1
GND_CH1
I+_CH1
V+_CH2
GND_CH2
I+_CH2
V+_CH3
GND_CH3
I+_CH3
V+_CH4
GND_CH4
I+_CH4
VEXT+
VEXT-
V+_CH5
GND_CH5
I+_CH5
V+_CH6
GND_CH6
I+_CH6
V+_CH7
GND_CH7
I+_CH7
V+_CH8
GND_CH8
I+_CH8
VEXT+1
VEXT-1
CH 001
RED
BLK
SH
24 VDC
DC_GND
EXTERNAL CONNECTOR
C16
INTELLIFAUCET
A:4-20+
B:4-20-
C:START
D:STOP
E:DGND
F:READY
G:TEMP/FLOW
WH
BLK
GRN
BLK
BLUE
BLK-UNUSED
{13}
MW100-DO10
TB
CH 041
CH 042
CH 043
CH 044
CH 045
CH 046
CH 047
CH 048
CH 049
CH 050
NO-CH1
COM-CH1
NO-CH2
COM-CH2
NO-CH3
COM-CH3
NO-CH4
COM-CH4
NO-CH5
COM-CH5
NO-CH6
COM-CH6
NO-CH7
COM-CH7
NO-CH8
COM-CH8
NO-CH9
COM-CH9
NO-CH10
COM-CH10
TB
REFER TO HEWH-WIRING DIAGRAM FOR CABLE LAYOUT
24 VDC
DC_GND
{40}
24+ L
24_0 N
EGND
GND
TB
POW_R1
POW_R2
4IO-OAC
1:VDC 1:NC
2:GND1 2:L_IN1
3:IN1 3:L_OUT1
4:GND2 4:L_IN2
5:IN2 5:L_OUT2
6:GND3 6:L_IN3
7:IN3 7:L_OUT3
8:GND4 8:L_IN4
9:IN4 9:L_OUT4
{21}(1)
{33}
P$5
V2 V1
{38}
TB
{28}
EXTERNAL CONNECTOR
120VAC CHORD
L
EGND
N
C20
GND
TB
120 VAC N
120 VAC L
C8A
SOL: 120_N
SOL:DRAIN_L
SOL:OUT_L
SOL:IN_L
EXTERNAL CONNECTIONS
{23}: DRAIN
{23}: OUT
{23}: IN
{23} MANUAL OVERIDE
{29}
LED1
{32}
DRM_1:RJ45 PIN4
{44}
RJ45
RJ45-8X
C13
DRM_0:RJ45 PIN5
DRM_REF:RJ45 PIN8
EXTERNAL CONNECTIONS

DWG.NO.	HEWH-CB1	GENERAL ELECTRIC
TITLE:	HEWH - CONTROL BOX	REV. 2
		PAGE: 1 OF 5
DATE:	10/27/2007	AUTH: JYC


C4
TB
RTD_I_IN
RTD_C_IN
RTD_A_IN
RTD_B_IN
RTD_SHIELD
RED
BLK
WHT
GRN
SH
Temperature1
LIKEWISE FOR C5/TEMP2, C6/TEMP3
C1
PRES_HIGH1_POW
PRES_HIGH1_GND
PRES_HIGH1_SIG
PRES_HIGH1_GND1
PRES_HIGH1_SHIELD
PRESSURE1
LIKEWISE FOR C2/PRESSURE2, C3/PRESSURE3
C9
SERIAL1
LIKEWISE FOR C10/SERIAL2, C11/SERIAL3, C12/SPARE
C7
RELAY POWER
RELAY GND
HEATER1
HEATER2
RELAY SHIELD
4IO-IAC
1:VDC
2:GND
3:IN1
4:GND
5:IN2
6:GND
7:IN3
8:GND
9:IN4
1:NC
2:L_IN1
3:N_IN1
4:L_IN2
5:N_IN2
6:L_IN3
7:N_IN3
8:L_IN4
9:N_IN4
L1
GND
L2
H1
H2
H3
X1
RJ-45, DRM
RJ45-8X
C13
Field Wiring
DWG.NO. HEWH-PP1
GENERAL ELECTRIC
TITLE: PATCH PANEL BOX WIRING
REV. 2
PAGE: 1 OF 1
DATE: 12/15/2010
AUTH: JYC

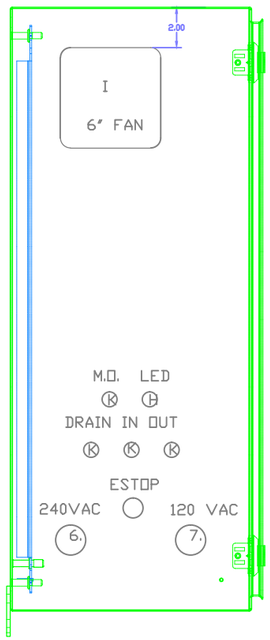
DWG NO	B	SHT 1

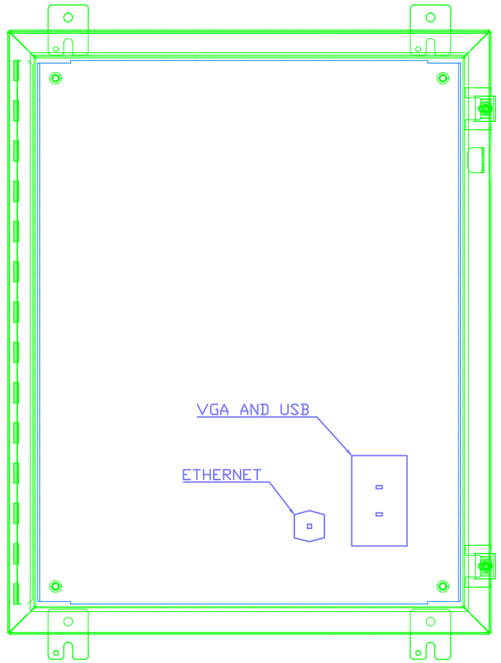
REVISION		
REV		-
	DATE: 10/11/2010	0

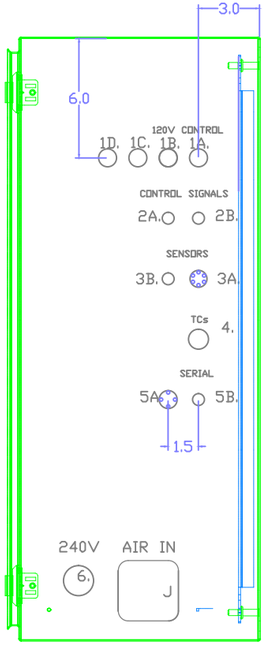


NOTES:

1A: 7310K14, PG16 (0.89" OD) CHORD GRIP 1X WIRE 5. HEWH WIRING REF. C8
1B,1C,1D: ONLY ON RLT UNITS, 7310K14, PG16 (0.89" OD) CHORD GRIP 1X WIRE 5. HEWH WIRING REF. C8
2A: 7310K12, PG9 (.6 OD) CHORD GRIP 1X WIRE 3. HEWH WIRING REF. C16
2B: 7310K12, PG9 (.6 OD) CHORD GRIP 1X WIRE 1. HEWH WIRING REF. C17.
3A: 7807K43, CHORD GRIP 1/2"NPT 0.84 OD, 6X WIRE 1. HEWH WIRING REF. C1-C6.
3B: 7310K12, CHORD GRIP 1X WIRE 1. HEWH WIRING REF. C7.
4: 5595K5, 1" MOUNTING HOLE. HEWH WIRING REF. C21.
5A: 7807K14, 3/14 NPT (1.05" OD) CHORD GRIP 4X WIRE 1. HEWH WIRING REF. C9-C12.
5B: 7310K12, PG9 (0.6 OD) CHORD GRIP 1X WIRE 5. HEWH WIRING REF. C13.
6: 7310K14, PG16 (0.89" OD) CHORD GRIP 1X WIRE 4. HEWH WIRING REF. C14, C15
7: 7310K14, PG16 (0.89" OD) CHORD GRIP 1X WIRE 2. HEWH WIRING REF. C20
H: LED INDICATION OF MANUAL OVERRIDE
I: 120 VAC 6" VENTILATION FAN
J: AIR VENTILATION INLET
K: MANUAL OVERIDE SWITCHES







UNCONTROLLED IF PRINTED

ARTICLE OR MATERIAL MUST CONFORM TO RoHS PROCEDURE SI 900000 SECT 13 AND REACH PROCEDURE SI 900000 SECT 14	UNLESS OTHERWISE SPECIFIED	APPROVED BY:	DATE
DO NOT SCALE THIS DRAWING	DIMENSIONS ARE IN INCHES.	DRAWN Jyc	10/28/2010
THIRD ANGLE PROJECTION	DIMENSIONS IN [] ARE IN MM.	CHECKED	
	TOLERANCES ON:	ENGRG.	
	2 PL DECIMALS ± tolerance_2pl	ISSUED	
	3 PL DECIMALS ± tolerance_3pl		
	ANGLES ± tolerance_angle °		
	FRACTIONS ± tolerance_fraction		
	PART MUST CONFORM TO SI 900000 SECT.4 GEA TOXICITY PROCEDURE		

GENERAL ELECTRIC
DEPT LOC LOUISVILLE, KY.

TITLE

HEWH DAQ BOX

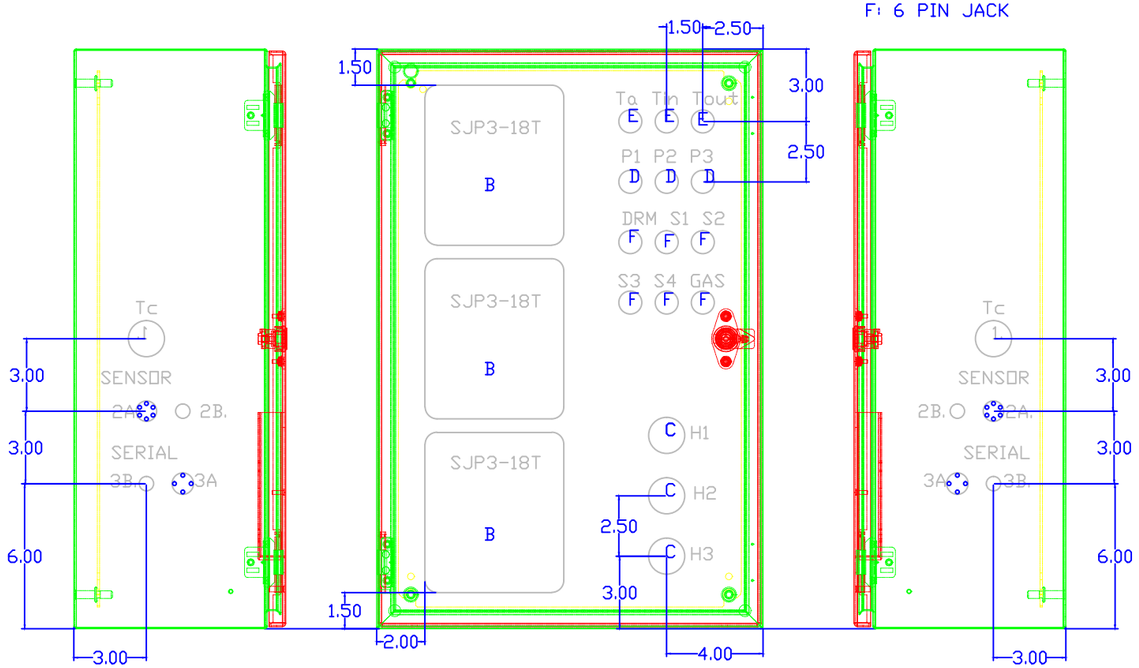
SIZE	DWG. NO. & FILENAME	
B	HEWH-CP-Holes1	B

DRW VER	GEOM VER	STATUS	SHEET: 1 OF 1

DWG NO	B	SHT 1

REVISION		
REV		-
	DATE: 8/13/2010	0

NOTES: CHORD GRIP pn'S FROM McMASTER CARR:
1: 1" OD, pn.55595K5 Chord Grip - FOR TcS.
2A: pn.7807K43, CHORD GRIP 1/2"NPT (0.84" OD), 6X WIRE 1. HEWH WIRING REF. C1-C6.
2B: pn.7310K12, PG9 (0.6" OD) CHORD GRIP 1X WIRE 1. HEWH WIRING REF. C7.
3A: pn.7807K14, 3/4 NPT (1.05" OD) CHORD GRIP 4X WIRE 1. HEWH WIRING REF. C9-C12.
3B: pn.7310K12, PG9 (0.6" OD) CHORD GRIP 1X WIRE 5. HEWH WIRING REF. C13.
B: TEMPERATURE JACK PANNELS
C: HEATER PICKUPS (TURNLOCK, 240VAC)
D: 4 PIN JACK
E: 5 PIN JACK
F: 6 PIN JACK



LEFT SIDE HOLE DRAWING

RIGHT SIDE HOLE DRAWING

HOLES TO BE PUNCHED IN EITHER THE RIGHT SIDE OR THE LEFT SIDE, NOT BOTH.

UNCONTROLLED IF PRINTED

ARTICLE OR MATERIAL MUST CONFORM TO RoHS PROCEDURE SI 900000 SECT 13 AND REACH PROCEDURE SI 900000 SECT 14	UNLESS OTHERWISE SPECIFIED	APPROVED BY:	DATE
DO NOT SCALE THIS DRAWING	DIMENSIONS ARE IN INCHES.	DRAWN jyc	10/28/2010
THIRD ANGLE PROJECTION	DIMENSIONS IN [] ARE IN MM.	CHECKED	
	TOLERANCES ON:	ENGRG.	
	2 PL DECIMALS ± tolerance_2pl	ISSUED	
	3 PL DECIMALS ± tolerance_3pl		
	ANGLES ± tolerance_angle °		
	FRACTIONS ± tolerance_fraction		
	PART MUST CONFORM TO SI 900000 SECT.4 GEA TOXICITY PROCEDURE		

GENERAL ELECTRIC
DEPT LOC LOUISVILLE, KY.

TITLE

HEWH PATCH PANNEL

SIZE	DWG. NO. & FILENAME	
B	HEWH-PP-Holes1	B

DRW VER	GEOM VER ---	STATUS	SHEET: 1 OF 1

Frontplattenausschnitt (Rückseite)

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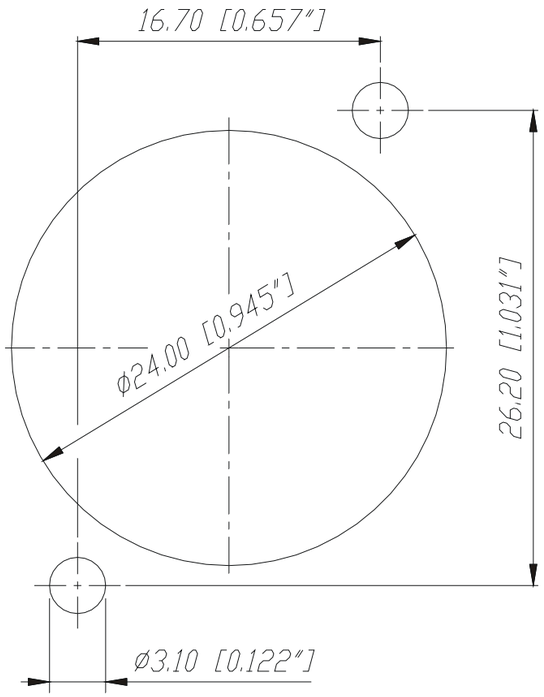

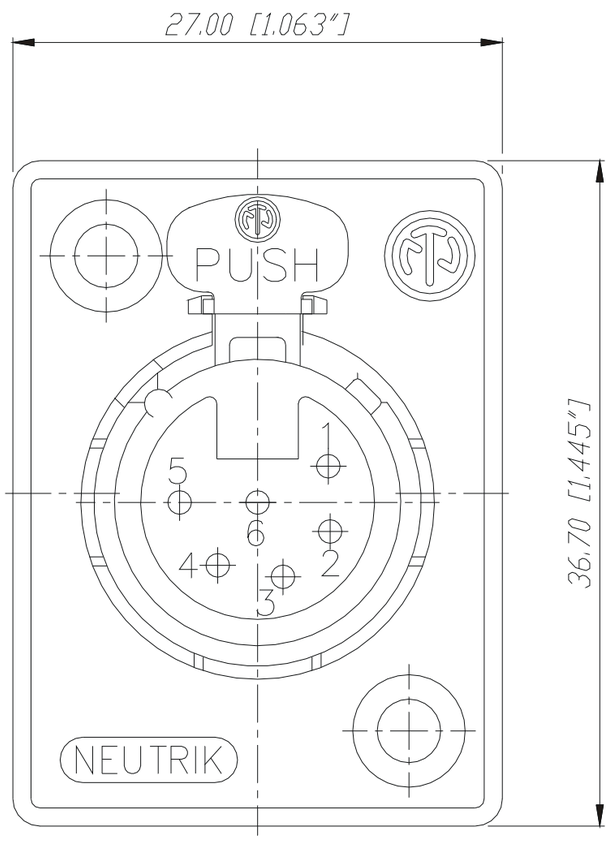

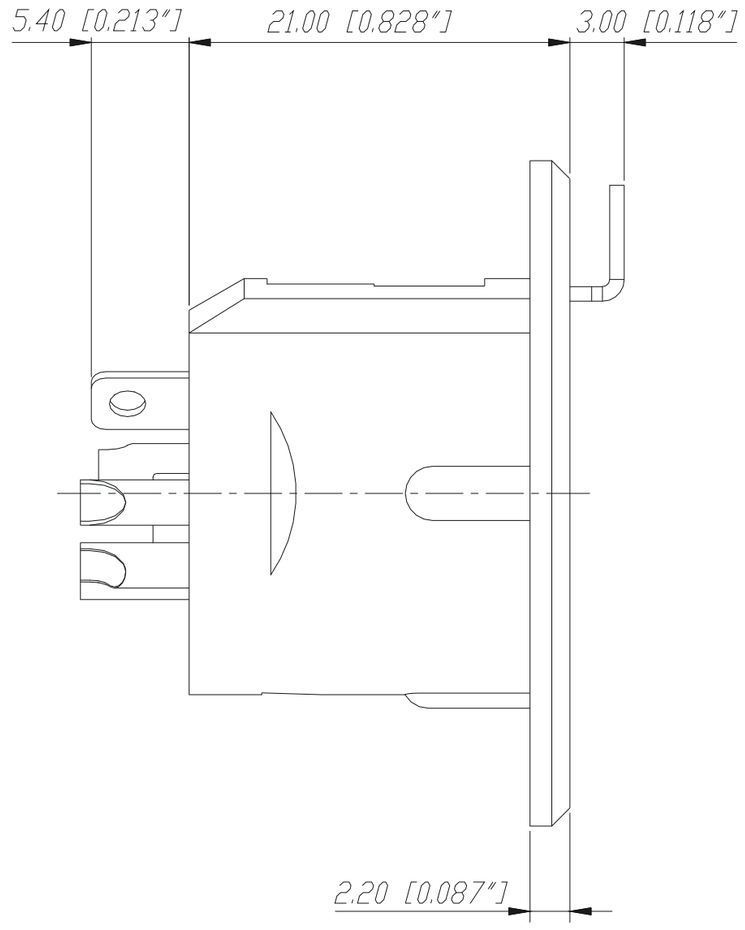

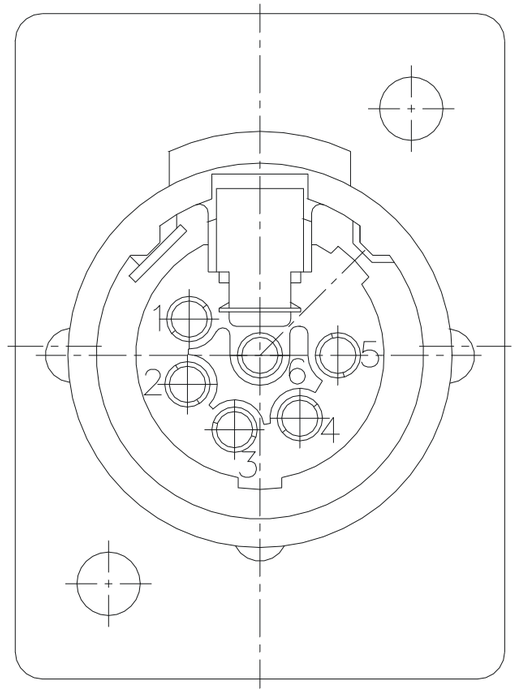

				*)Lieferant darf ohne Ruecksprache nicht geaendert werden	Werkstoff:	Massstab: 3:1		Datum	Name
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							Geprueft		
							Gesehen		
				Benennung: (FP-1) NC6FP-1			Ersetzt durch:		Blatt
							Ersatz fuer:		von Blatt
A	Aktuelle Zeichnung	27.03.98	Alinjak	NEUTRIK AG FL-9494 SCHAAN			Zeichn. Nr. 3102 St 11 28		
Ind.	Aenderung	Datum	Name						

Frontplattenausschnitt (Rückseite)

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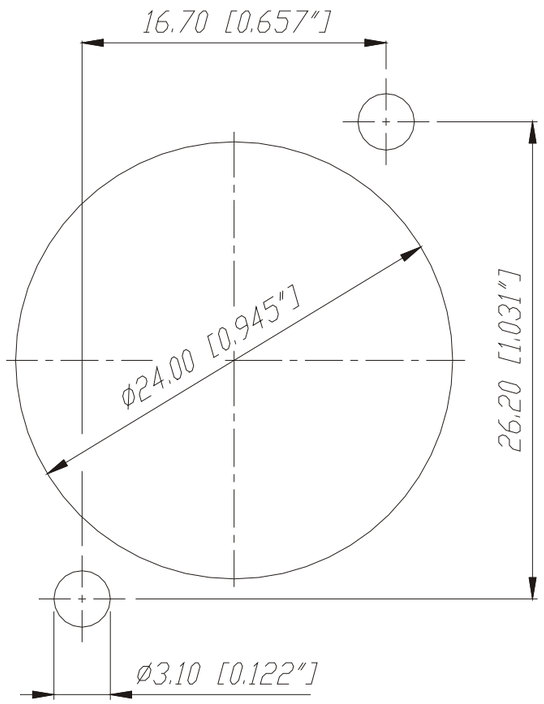

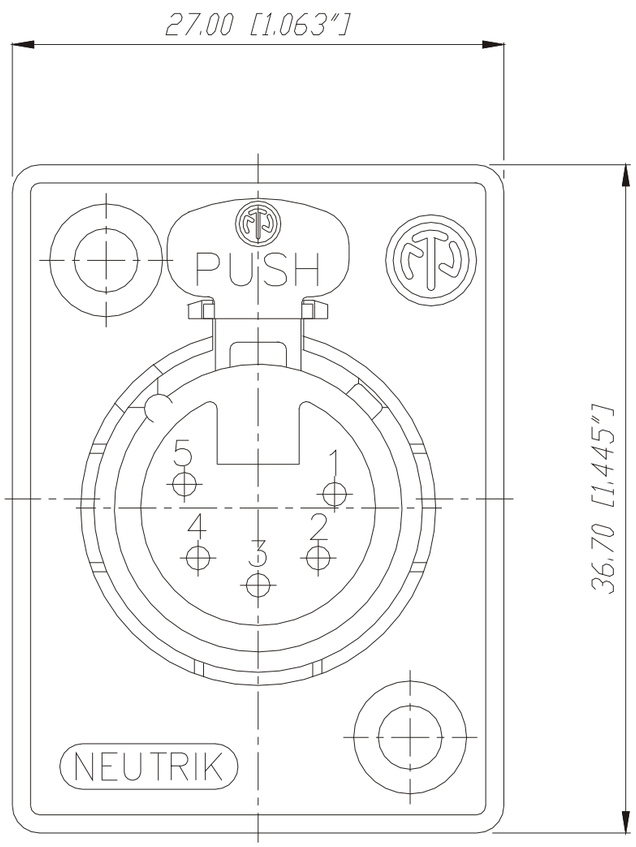

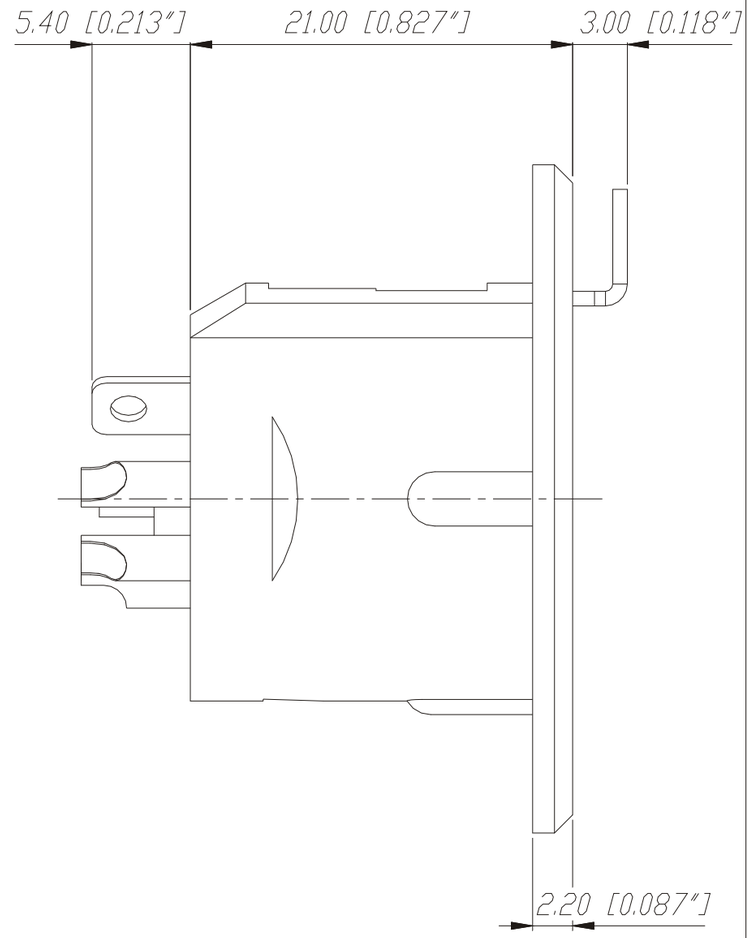

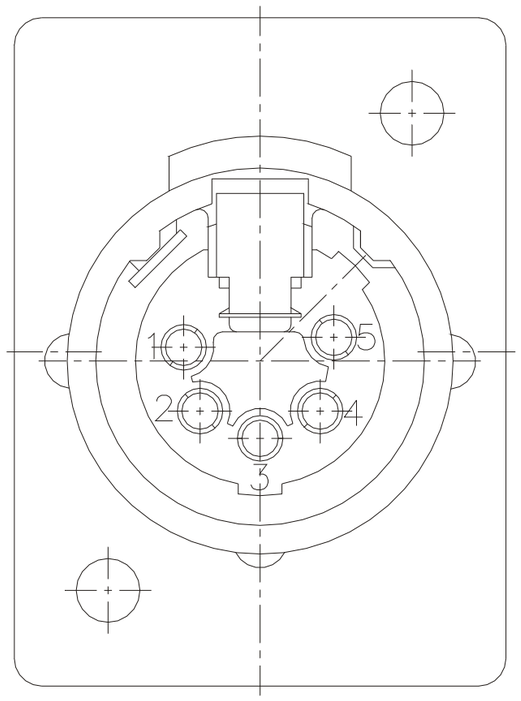

A	Aktuelle Zeichnung	27.03.98	Alin jak						
Ind.	Aenderung	Datum	Name						

*)Lieferant darf ohne Ruecksprache nicht geaendert werden	Werkstoff:	Massstab:		Datum	Name
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Zeichnung urheberrechtlich geschuetzt (DIN 34) (C)			Geprueft		
			Gesehen		
Benennung: (FP-1) NC5FP-1			Ersetzt durch:		Blatt
			Ersatz fuer:		von Blatt
NEUTRIK AG FL-9494 SCHAAN			Zeichn. Nr. 3102 St 11 27		

Frontplattenausschnitt (Rückseite)

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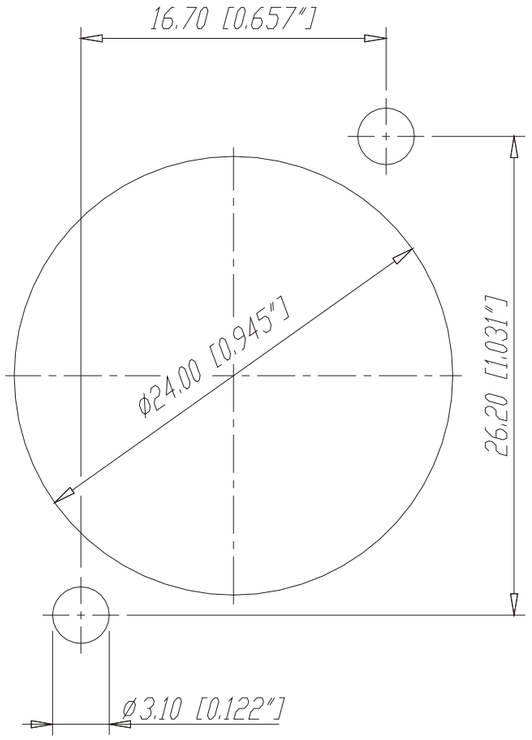

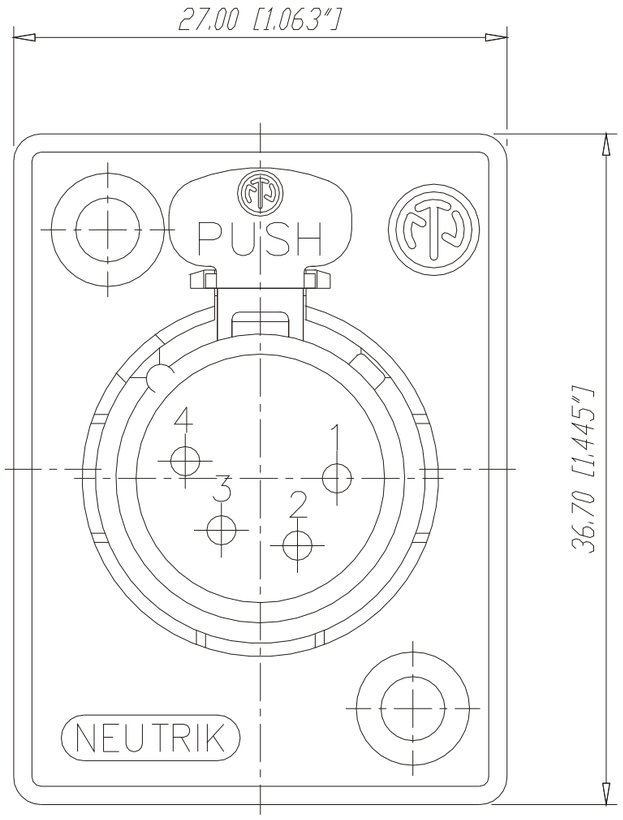

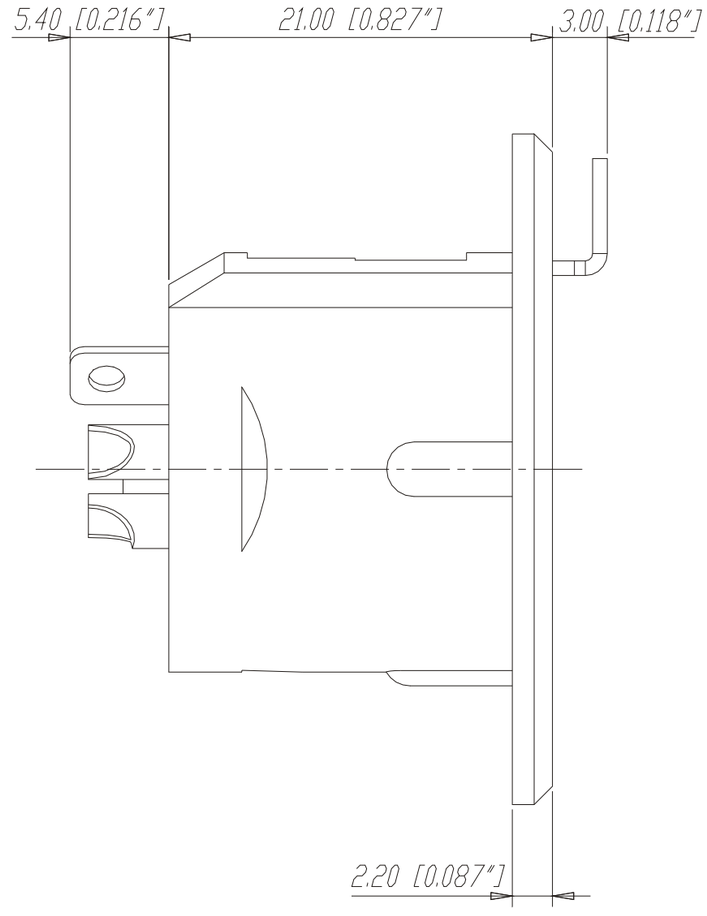

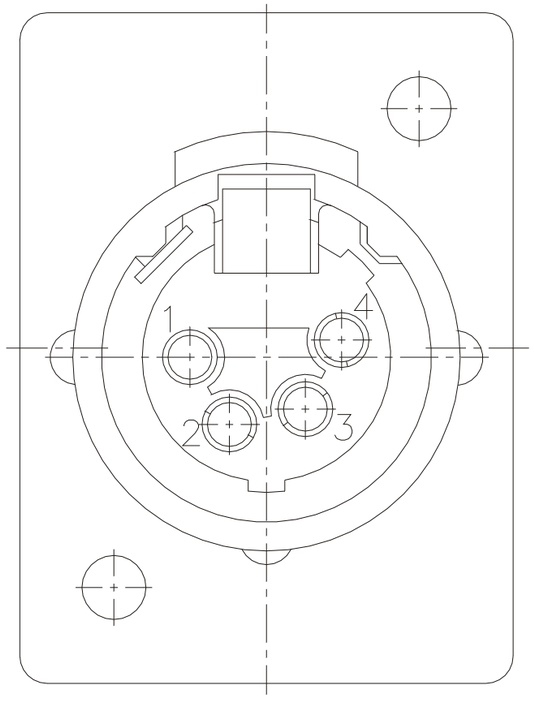

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Ind.	Aenderung	Datum	Name						