



Rack Tester



User Manual

***Approved for Terminal Rack
Testing in Explosive Environments***

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Rack Tester - User Manual

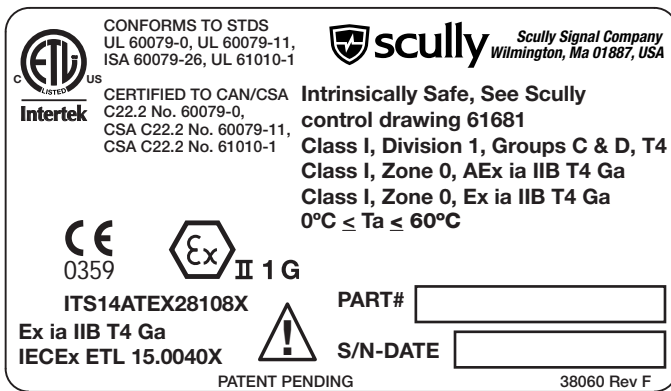
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Introduction

The Scully Rack Tester is a portable tester which allows Scully customers and field personnel to quickly assess the Rack controller for proper equipment operation and, in the event of a malfunction, facilitate problem isolation and resolution. The Rack Tester can emulate sensor's wet and dry functions of a truck based overfill system.

The Scully Rack Tester is designed with intrinsically safe outputs and is certified to operate in Division I and Zone 0 hazardous locations.



The Scully Rack Tester is a portable, self-contained device which incorporates a number of switches, connectors, and all required circuitry necessary to simulate 2-Wire Optic, 5-Wire Optic, and Thermistor sensors, ground, and truck identification module (T.I.M.) functions required to verify proper rack operation.

Safety Approvals

The Scully Rack Tester has safety approvals as an intrinsically safe testing device for use in:

- Canada and the United States:
Class I, Division 1, Groups C & D, T4
Class I, Zone 0, AEx ia IIB T4 Ga
Class I, Zone 0, Ex ia IIB T4 Ga

- ATEX & International




II 1 G


Ex ia IIB T4 Ga

With Intrinsically Safe outputs to the EN 13922
Connectors

- Entity Parameters
 $U_i = 15V$, $I_i = 250mA$, $P_i = 1.0W$, $C_i = 1.25\mu F$, $L_i = 0$
- $U_m = 15Vdc$
- Pollution Degree 2
- Ambient temperature for all ratings
 $(T_a \leq 0^\circ C \text{ to } \leq 60^\circ C)$ at 95% humidity
- Maximum Altitude = 6562 ft. (2000 m)

Safety Warnings

 **WARNING:** *Improper connections, component substitution or tampering may impair intrinsic safety and create hazardous conditions.*

 **AVERTISSEMENT:** *des connexions mal effectuées, la substitution ou la manipulation des composants peuvent nuire à la sécurité intrinsèque et créer des conditions dangereuses.*

ADDITIONAL IMPORTANT INFORMATION:

The Rack Tester is not intended to be used in precipitation or any kind of inclement weather. Scully Rack Tester has been designed to be impact resistant. It should not be used if the enclosure is damaged.

Do not allow the unit to come in contact with aggressive substances.

There are no field replaceable parts inside.

This product does not conform to requirements of Clause 6.3.13 of IEC/EN/UL/CSA C22.2 No. 60079-11. There is no insulation between the Intrinsically Safe circuit and frame of the electrical equipment as the circuit is referenced to the frame. Equipotential bonding for the system is maintained between the power supply (Associated Apparatus) and the Rack Tester (I.S. Apparatus) when the device is connected via the EN 13922 connectors.

United States and Canada

CAN/CSA C22.2# 61010-1, Issue:2012/05/11 Ed:3

Safety Requirements For Electrical Equipment For Measurement, Control, and Laboratory Use - PART 1: GENERAL REQUIREMENTS

UL 61010-1, Issued: 2012/05/11 Ed:3

Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use - Part 1: General Requirements

UL 60079-0, Issued: 2009/10/21 Ed: 5 Rev: 2009/12/08

Explosive Atmospheres - Part 0 - General Requirements

UL 60079-11, Issued: 2013/02/15 Ed: 6

Explosive Gas Atmospheres - Part 11: Equipment Protection by Intrinsic Safety "I"

ISA 60079-26, issue:2011

Explosive atmospheres - part 26: equipment for use in class 1, zone 0 hazardous (classified) locations

CSA C22.2#60079.0, issue:2011/12/01

Explosive atmospheres - part 0: equipment - general requirements

CSA C22.2#60079-11, Issue:2011/12/01

Electrical Apparatus for Explosive Gas Atmospheres Part 11: Intrinsic Safety "i"

ATEX Directive (Europe CENELEC Standards)

EN 60079-0, Issued: 2012/08/01

Explosive Atmospheres - Part 0: Equipment – General Requirements

EN 60079-11, Issue:2012/01/01

Explosive atmospheres - Part 11: Equipment Protection by intrinsic safety "i"

Additional Standards

EN 60079-26, Issued:2007/03/01

Explosive atmospheres - Part 26: Equipment with Equipment Protection Level (EPL) GA

IECEx Scheme for Hazardous Locations

IEC 60079-0, Issue 2011/06/22 Ed: 6

Explosive Atmospheres - Part 0: Equipment – General Requirements

IEC 60079-11, Issued: 2011/06/30 Ed:6

Electrical Apparatus for Explosive Gas Atmospheres Part 11: Intrinsic Safety "I"; with Corrigendum 1; 2012/01/27

IEC 60079-26, Issued:2006/08/01 Ed:2

Explosive atmospheres Part 26: Equipment with EPL Ga-

Environmental

ANSI/NEMA 250-2008 Enclosures for Electrical Equipment (1000 Volts Maximum)

ANSI/IEC 60529-2004 (R2011) Degrees of Protection Provided by Enclosures (IP Code)

Electromagnetic Compatibility (EMC)

FCC 47CFR PT 15 SPT B Issued: 2013/01/28 Title 47 CFR Part 15 Subpart B: Unintentional Radiators, Class A

EMC Directive for the European Union (EU)

IEC 61000-6-4 Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments

IEC 61000-6-2 Electromagnetic Compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments

Overfill Prevention

EN 13922 compliant, Tanks for transport of dangerous goods - Service equipment for tanks - Overfill prevention systems for liquid fuels

Panel Layout

Blue 5-Wire Optic Connector

Ground Testing

T.I.M. Testing

Green 2-Wire Optic/Thermistor Connector



Black 5-Wire Optic Connector

5-Wire Optic Sensor Testing

2-Wire Optic/Thermistor Sensor Testing

Connectors



CONNECTOR	FUNCTION	DESCRIPTION
J1	Scully J1	Blue 5-Wire Optic
J2	Scully J2	Black 5-Wire Optic
J3	Scully J3	Green 2-Wire Optic Or Thermistor
Ground Ball	Ground	Plug

Switches



SWITCH	FUNCTION	DESCRIPTION
DIODE OPEN RES	Ground Testing	Up – Connects through Diode Mid - No/Open Ground Down – Resistive Ground
SHORT TIM Out TIM In	Simulates Power Supply Short & Enables T.I.M. *	Up – Supply Ground to Pin 9 Mid – TIM Disconnected Down – T.I.M. Enabled
SENSOR	5-Wire Sensor	Sets the number of 5-Wire sensors indicated on the diagnostic line.

* Truck Identification Module T.I.M. must be programmed in to the Intellitrol/Terminal Automation System (TAS) to use this feature.

Rack Tester Operation

SWITCH	FUNCTION	DESCRIPTION
5-Wire Optic	Simulates Wet, Dry, or Short on 5-Wire sensors	Up – Simulates All Dry Sensors Mid – Simulates Wet Sensor Down – Simulates Shorted Sensor
Switches 1,2,3,4	Sensors 1,2,3,4 Heated Thermistors	Up - 2-Wire Optic In Mid - Open/No Sensor Down - Heated Thermistor In
Switches 5,6,7,8	Sensors 5,6,7,8 Non-Heated Thermistors	Up - 2-Wire Optic In Mid - Open/No Sensor Down – Non-Heated Thermistor In

1. Set switches to situation to be simulated
2. Connect the rack controller via cable to J1, J2 or J3
3. Simulate fault by toggling appropriate switches
4. Disconnect from the rack controller

NOTE: The Truck must be “disconnected” between simulating 2-Wire and 5-Wire trucks and additionally, between resistive and ground bolt testing. This can be accomplished by actually physically disconnected the cable.

Ground Testing

Rack control units are generally set to either diode or resistive ground. The Ground testing switch has three positions:

1. The upper position connects the Ground Ball to Ground through a Diode. This should illuminate a Permit, with a Diode Ground.
2. The center position disconnects the Ground ball entirely, and should create a NO-PERMIT GND Light indicator to illuminate.
3. The Bottom position connects the Ground Ball to ground through a 1000 Ohm resistor. This should illuminate a PERMIT with a resistive ground indicator to illuminate.

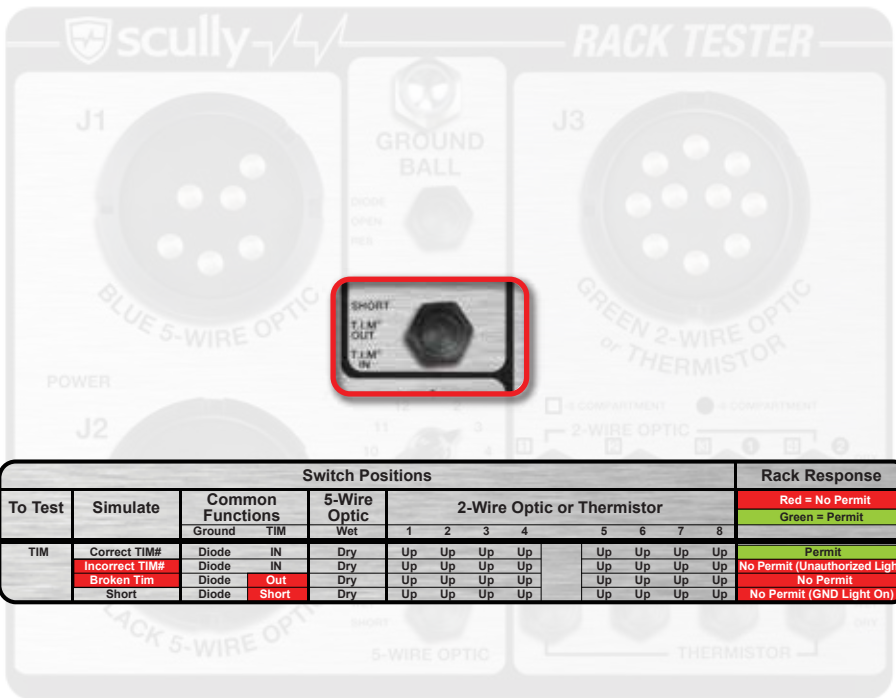


Switch Positions										Rack Response				
To Test	Simulate	Common Functions		5-Wire Optic	2-Wire Optic or Thermistor								Red = No Permit	Green = Permit
		Diode	TIM	Dry	1	2	3	4	5	6	7	8		
Ground (b)	Normal	IN	Dry	Up	Up	Up	Up	Up	Up	Up	Up	Up	Up	Permit (with Diode Ground)
	No Gnd	Open	IN	Dry	Up	Up	Up	Up	Up	Up	Up	Up	Up	No Permit (GND Light On)
Ground (R)	Normal	Resistor	IN	Dry	Up	Up	Up	Up	Up	Up	Up	Up	Up	Permit (with Resistive Ground)

T.I.M. Testing

Similarly, the T.I.M. switch has three positions:

1. The upper position (spring returned, momentary connection) disconnects the TIM module and provides a shorted path from Pin 9 to Ground. In the momentary upper SHORT position, the NO-PERMIT GND light should illuminate.
2. In the Center position, the T.I.M. is disconnected. The NO-PERMIT Idle light should illuminate.
3. In the bottom position, the T.I.M. is connected. If the T.I.M. number is entered correctly, the PERMIT indicator will illuminate. If the T.I.M. number is incorrect, the NO-PERMIT Unauthorized light will illuminate.



NOTE: If you are utilizing the VIP option on your Intellitrol, you must first enter the T.I.M. ID number into your system through your PLC/Terminal Auto System. To do this, hook up the tester with the T.I.M. switch in the down position, (T.I.M In) then read the T.I.M. number, and add as a permissive T.I.M.

Sensor Testing

2-Wire Optic Sensors

The first two switches on the left of 2-Wire optic/thermister section are only used for rack control units set to 8 compartments. If your rack control unit is set for 6 compartments, start with the 6 compartment switch 1.

For 2-Wire Optic testing, switches 1 through 8 simply replicate the functions of 8 2-Wire Optic sensors. When all 8 switches are UP, all sensors report DRY, therefore, PERMIT is enabled. If ANY of the 8 switches is moved to the CENTER Position, indicating WET, the NO-PERMIT indicator for the appropriate sensor is illuminated.



		Switch Positions										Rack Response			
To Test	Simulate	Common Functions		5-Wire Optic	2-Wire Optic or Thermistor								Red = No Permit	Green = Permit	
		Ground	TIM	Wet	1	2	3	4	5	6	7	8			
2 Wire	Normal	Diode	IN	X	Up	Up	Up	Up		Up	Up	Up	Up	Permit	
	#1 Wet	Diode	IN	X	Mid	Up	Up	Up		Up	Up	Up	Up	NO Permit (#1 On)	
	#2 Wet	Diode	IN	X	Up	Mid	Up	Up		Up	Up	Up	Up	NO Permit (#2 On)	
	#3 Wet	Diode	IN	X	Up	Up	Mid	Up		Up	Up	Up	Up	NO Permit (#3 On)	
	#4 Wet	Diode	IN	X	Up	Up	Up	Mid		Up	Up	Up	Up	NO Permit (#4 On)	
	#5 Wet	Diode	IN	X	Up	Up	Up	Up	Mid		Up	Up	Up	NO Permit (#5 On)	
	#6 Wet	Diode	IN	X	Up	Up	Up	Up	Up	Mid		Up	Up	NO Permit (#6 On)	
	#7 Wet	Diode	IN	X	Up	Up	Up	Up	Up	Up	Mid		Up	NO Permit (#7 On)	
	#8 Wet	Diode	IN	X	Up	Up	Up	Up	Up	Up	Up	Mid		NO Permit (#8 On)	

Sensor Testing

Thermistor Sensors

When switches 1 through 8 are used to simulate Thermistor sensing, setting ALL switches to their DOWN position simulates a DRY condition for all sensors. Consequently, a PERMIT indicator is illuminated.

When ANY of the switches is changed to its MIDDLE position, simulating WET, the NO-PERMIT indicator for the appropriate sensor will be illuminated.

Switches 1-4 operate heated thermistors and are rated -40°C to +40°C. 5-8 are non-heated thermistors and are rated for temperatures -18°C to +55°C.



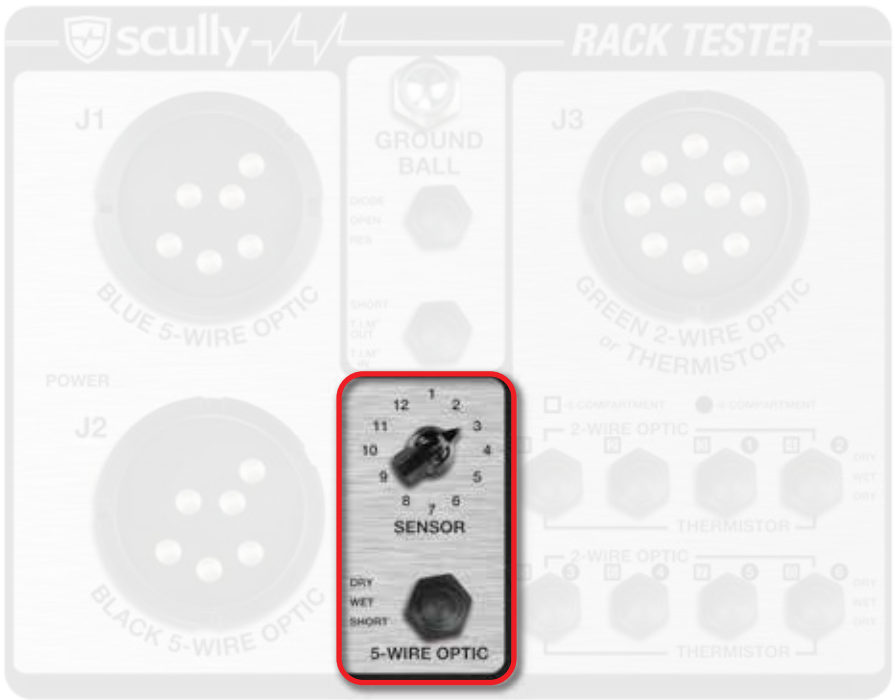
		Switch Positions								Rack Response						
To Test	Simulate	Common Functions		5-Wire Optic	2-Wire Optic or Thermistor								Red = No Permit	Green = Permit		
		Ground	TIM		1	2	3	4	5	6	7	8				
Thermistor	Normal	Diode	IN	X	Down	Down	Down	Down	Down	Down	Down	Down	Down	Down	Down	Permit
	#1 Wet	Diode	IN	X	Mid	Down	Down	Down	Down	Down	Down	Down	Down	Down	Down	NO Permit (#1 On)
	#2 Wet	Diode	IN	X	Down	Mid	Down	Down	Down	Down	Down	Down	Down	Down	Down	NO Permit (#2 On)
	#3 Wet	Diode	IN	X	Down	Down	Mid	Down	Down	Down	Down	Down	Down	Down	Down	NO Permit (#3 On)
	#4 Wet	Diode	IN	X	Down	Down	Down	Mid	Down	Down	Down	Down	Down	Down	Down	NO Permit (#4 On)
	#5 Wet	Diode	IN	X	Down	Down	Down	Down	Mid	Down	Down	Down	Down	Down	Down	NO Permit (#5 On)
	#6 Wet	Diode	IN	X	Down	Down	Down	Down	Down	Mid	Down	Down	Down	Down	Down	NO Permit (#6 On)
	#7 Wet	Diode	IN	X	Down	Down	Down	Down	Down	Down	Mid	Down	Down	Down	Down	NO Permit (#7 On)
	#8 Wet	Diode	IN	X	Down	Down	Down	Down	Down	Down	Down	Down	Mid	Down	Down	NO Permit (#8 On)

5-Wire Optic Sensors

The 5-Wire Optic toggle switch, together with the Sensor Rotary switch, provides a number of sensor simulation functions.

1. When the Optic Toggle switch is in the DRY position (Switch UP), regardless the position of the Rotary Switch, PERMIT is enabled.
2. When the Optic Toggle switch is in SHORT position (Switch DOWN) regardless the position of the Rotary Switch, a shorted sensor is simulated, and the NO-PERMIT indicated is illuminated.
3. When the Toggle is in the WET position (Center) the Rotary switch is used to simulate which of the numerous sensors is indicating a WET condition. Note that position #1 on the Rotary switch simulates the first sensor is WET. Positions #2 through #12 simulate sensors #2 through Sensor #12 indicating a WET condition.

Sensor Testing



		Switch Positions								Rack Response				
To Test	Simulate	Common Functions		5-Wire Optic	2-Wire Optic or Thermistor									
		Ground	TIM	Wet	1	2	3	4	5	6	7	8		
5 Wire	Normal	Diode	IN	Dry	X	X	X	X		X	X	X	X	Permit
	Wet and Select	Diode	IN	Wet	X	X	X	X		X	X	X	X	No Permit (Selected Sensor)
	Short	Diode	IN	Short	X	X	X	X		X	X	X	X	No Permit

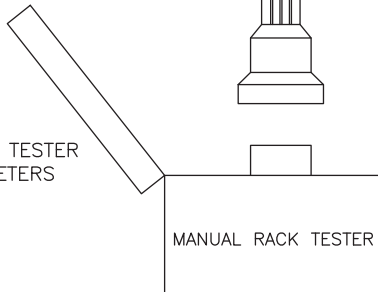
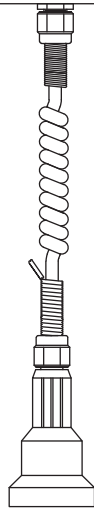
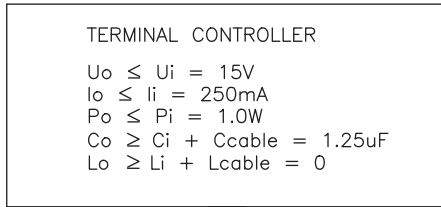
Rack Tester Operations Chart

Switch Positions										Rack Response		
To Test	Simulate	Common Functions		2-Wire Optic or Thermistor						Rack Response		
		Ground	TIM	1	2	3	4	5	6			7
Ground (D)	Normal	Diode	IN	Up	Up	Up	Up	Up	Up	Up	Up	Permit (with Diode Ground)
	No Gnd	Open	IN	Up	Up	Up	Up	Up	Up	Up	Up	No Permit (GND Light On)
Ground (R)	Normal	Resistor	IN	Up	Up	Up	Up	Up	Up	Up	Up	Permit (with Resistive Ground)
	Correct TIM#	Diode	IN	Up	Up	Up	Up	Up	Up	Up	Up	Permit
TIM	Incorrect TIM#	Diode	IN	Up	Up	Up	Up	Up	Up	Up	Up	No Permit (Unauthorized Light)
	Broken Tim	Diode	Out	Up	Up	Up	Up	Up	Up	Up	Up	No Permit
5 Wire	Short	Diode	Short	Up	Up	Up	Up	Up	Up	Up	Up	No Permit (GND Light On)
	Normal	Diode	IN	X	X	X	X	X	X	X	X	Permit
5 Wire	Wet and Select	Diode	IN	X	X	X	X	X	X	X	X	No Permit (Selected Sensor)
	Short	Diode	IN	X	X	X	X	X	X	X	X	No Permit
2 Wire	Normal	Diode	IN	Up	Up	Up	Up	Up	Up	Up	Up	Permit
	#1 Wet	Diode	IN	Mid	Down	Up	Up	Up	Up	Up	Up	NO Permit (#1 On)
	#2 Wet	Diode	IN	Up	Mid	Down	Up	Up	Up	Up	Up	NO Permit (#2 On)
	#3 Wet	Diode	IN	Up	Up	Mid	Down	Up	Up	Up	Up	NO Permit (#3 On)
	#4 Wet	Diode	IN	Up	Up	Up	Mid	Down	Up	Up	Up	NO Permit (#4 On)
	#5 Wet	Diode	IN	Up	Up	Up	Up	Mid	Down	Up	Up	NO Permit (#5 On)
	#6 Wet	Diode	IN	Up	Up	Up	Up	Up	Mid	Down	Up	NO Permit (#6 On)
	#8 Wet	Diode	IN	Up	Up	Up	Up	Up	Up	Mid	Down	NO Permit (#8 On)
Thermistor	Normal	Diode	IN	Down	Down	Down	Down	Down	Down	Down	Down	Permit
	#1 Wet	Diode	IN	Mid	Down	Down	Down	Down	Down	Down	Down	NO Permit (#1 On)
	#2 Wet	Diode	IN	Down	Mid	Down	Down	Down	Down	Down	Down	NO Permit (#2 On)
	#3 Wet	Diode	IN	Down	Down	Mid	Down	Down	Down	Down	Down	NO Permit (#3 On)
	#4 Wet	Diode	IN	Down	Down	Down	Mid	Down	Down	Down	Down	NO Permit (#4 On)
	#5 Wet	Diode	IN	Down	Down	Down	Down	Mid	Down	Down	Down	NO Permit (#5 On)
	#6 Wet	Diode	IN	Down	Down	Down	Down	Down	Mid	Down	Down	NO Permit (#6 On)
	#7 Wet	Diode	IN	Down	Down	Down	Down	Down	Down	Mid	Down	NO Permit (#7 On)
#8 Wet	Diode	IN	Down	Down	Down	Down	Down	Down	Down	Mid	NO Permit (#8 On)	

Control Drawing

NOTES:

1. THE MANUFACTURER'S TECHNICAL MANUAL AND THIS CONTROL DRAWING MUST BE FOLLOWED WHEN USING THIS EQUIPMENT.
2. THE ENTITY CONCEPT ALLOWS THE MANUAL RACK TESTER TO BE CONNECTED TO A TERMINAL WHEN THE FOLLOWING IS TRUE: $U_o \leq U_i$, $I_o \leq I_i$, $P_o \leq P_i$, $C_o \geq C_i + C_{cable}$, $L_o \geq L_i + L_{cable}$
3. WARNING: IMPROPER CONNECTIONS, COMPONENT SUBSTITUTION OR TAMPERING MAY IMPAIR INTRINSIC SAFETY AND CREATE HAZARDOUS CONDITIONS.



MANUAL RACK TESTER
ENTITY PARAMETERS
SEE NOTE 2

$U_i = 15V$
 $I_i = 250mA$
 $P_i = 1.0W$
 $C_i = 1.25\mu F$
 $L_i = 0$

<i>scully</i> SIGNAL COMPANY WILMINGTON, MA, U.S.A.	
TITLE: INTRINSIC SAFETY CONTROL DRAWING, MANUAL RACK TESTER	
DWG. NO. 61681	REVISION B

Scully - Setting Standards in Safety and Dependability since 1936.

For over seventy-five years Scully has been engineering and building products to the highest safety and reliability standards. We design and manufacture all of our systems under one roof to ensure complete quality control over our manufacturing and testing operations.

Scully is ISO certified and all of our products are made in the U.S.A. In addition, we back up our products with the best service in the industry. We have direct sales and service personnel in the U.S.A., The United Kingdom, and Europe and are represented in over 50 countries.

For more information and 24 hour technical assistance, call Scully Signal Company at 1-800-2SCULLY (1-800-272-8559)



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PATENT PENDING

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