

RB.CA.t-sens - the barrel RPC's temperature sensing cable

Introduction

This document describes the materials used to build the cables RB.CA.t-sens which carry the RPC's temperature signal from the detector up to the correspondent CAEN EASY power supply located in a wheel's tower. For each sector there are 5-6 of these cables, for a total of 62 cables/wheel. The grand total for all CMS is 310 cables. The estimated medium length is around 15 [m].

The responsible person for technical aspects of these cables is:

Dr. Pierluigi Paolucci **INFN** Napoli, e-mail: *pierluigi.paolucci@na.infn.it*

Cable

This cable is already IS23 certified, as it's sold at cern store, SCEM 04.21.51.055.4. The color is not blue as requested for MU cables so there will be two short pieces of IS41 Heat-Shrinkable blue tube in both sides. See **Appendix 1** for the data sheet.

Connector at the detector side

At detector side there is one **3M** socket series 3473-6600 each cable. It's glass filled polyester (PBT) made and UL 94V-0 rated. This connector is sold at CERN STORE too, SCEM 09.55.03.310.0. There are a total of 310 pieces for this cable, few kilos in all CMS detector. See **Appendix 3** for TIS approval.

Connectors at the tower side

At tower side this cable is to be connected to a CAEN EASY power supply and at present there isn't a final specification about which kind of connection will be adopted.

Appendix 1 – Cable

1.1 Cable's datasheet



CERN Stores Catalogue



SCEM Code: <input type="text"/>	Keyword(s): <input type="text"/>
<input type="button" value="Search"/>	

← [04.21.51.A](#)

[Group: 04.21](#)

→ [04.21.51.C](#)



04.21.51.B- TWISTED PAIR, SCREENED CABLES - 0,22 mm²

Technical information : [product manager](#)

SPECIFICATION : LO-GE N°447
 CONDUCTOR Tinned copper
 CONSTRUCTION : 7 x 0.20 mm dia.
 Dia. : 0.6 mm
 CROSS-SECTION : 0.22 mm²
 INSULATION PE
 Dia.1.0 mm
 ASSEMBLY Polyester foil
 SCREENING Tinned copper braid
 PROTECTION AL/PETP/AL foil
 SHEATH RAL 7031 dark grey polyolefine
 Max. o.d 5 mm
 SPECIFICATION RATED VOLTAGE 50 V r.m.s.
 DIELECTRIC STRENGTH - Between conductors 1000 V d.c
 - Between conductors and screen 2000 V d.c
 MUTUAL CAPACITANCE 60 nF/km
 IMPEDANCE 90 Ohm ±5%
 LINEAR RESISTANCE 94 Ohm/km
 OPERATING TEMPERATURE -20 to +60°C

[ACCORDING TO SAFETY INSTRUCTION IS 23](#)

[FOR LEMO OS 302 CONNECTORS :09.31.30.A](#)

Buy	SCEM Code	Unit	Unit Price	COND. Nb	COLOUR	TYPE CERN
 	04.21.51.055.4	MT	1.10	2	red, white	MC 02 P

Legend:

 In Stock CERN

 In Stock Supplier

 Not replenished

General information : [e-mail to Cern.Stores](#)

Appendix 2 – Connectors at detector side

2.1 Datasheet

3M™ Pak 100 Wiremount Socket

.100" × .100" for .050" Pitch Cable (Optional Plastic or Metal Strain Relief) 3000 Series



- Industry standard IDC socket
- Optional plastic or low profile metal strain relief
- Positive locking metal “J” clips provide high cover retention
- Mates with 3M headers, plugs and pin strips for quick connect/disconnect capability
- Open or closed end covers available
- Accepts flat cable or discrete wire
- Military polarization, with or without centerbump

Date Modified: May 30, 2003

TS-0718-06
Sheet 1 of 2

Physical

Insulation

Material: Glass Filled Polyester (PBT)
Flammability: UL 94V-0
Color: Gray

Contact

Material: Copper Alloy

Plating

Underplating and U-Slot: 100 μ" [2.54 μm] Nickel — QQ-N-290, Class 2
Wiping Area: 30 μ" [0.76 μm] Gold — MIL-G-45204, Type II, Grade C
Wire Accommodation: 26 & 28 AWG Solid or Stranded

Marking: 3M Logo, Part Identification Number and Orientation Triangle

Electrical

Current Rating: 1 A
Insulation Resistance: $> 1 \times 10^9 \Omega$ at 500 Vdc
Withstanding Voltage: 1000 Vrms at Sea Level

Environmental

Temperature Rating: -55°C to +105°C

UL File No.: E68080

3M

Interconnect Solutions

<http://www.3M.com/interconnects/>

3M is a trademark of 3M Company.

For technical, sales or ordering information call

800-225-5373

3M™ Pak 100 Wiremount Socket

.100" × .100" for .050" Pitch Cable (Optional Plastic or Metal Strain Relief) 3000 Series

Technical drawings showing top, side, and detail views of the 3M Pak 100 Wiremount Socket. Dimensions include: .24 [6.1] (width), A (length), .050 Typ* [1.27] (pitch), .15 [3.8] (height), .14 [3.6] (width), .050 Ref [1.27] (height), .26 [6.6] (height), .06 [1.5] Centerbump (Optional), .035 [0.89] (width), .14 [3.6] (width), .100 Typ [2.54] (pitch), .100 [2.54] (width), and A (length). Labels include: 3M NO.3XXX, Recessed for Cable Exit, See Note 2, Optional Closed End Cover, Nonconductive Transfer Adhesive with Liner, See Note 1, Triangle Indicates Position 1, Military: Dual Polarization Slots, Position 1, Position 2, and A.

Contact Quantity	Dimensions		
	Socket Series	A	B
10	3473	0.68 [17.3]	0.54 [13.7]
14	3385	0.88 [22.4]	0.74 [18.8]
16	3452	0.98 [24.9]	0.84 [21.3]
20	3421	1.18 [30.0]	1.04 [26.4]
24	3626	1.38 [35.1]	1.24 [31.5]
26	3399	1.48 [37.6]	1.34 [34.0]
30	3419	1.68 [42.7]	1.54 [39.1]
34	3414	1.88 [47.7]	1.74 [44.2]
36	9436	1.98 [50.3]	1.84 [46.7]
40	3417	2.18 [55.4]	2.04 [51.8]
44	9444	2.38 [60.5]	2.24 [56.9]
50	3425	2.68 [68.1]	2.54 [64.5]
60	3334	3.18 [80.8]	3.04 [77.2]

Assembled Height with Metal Profile Strain Relief: .54 Ref [13.7]

Assembled Height without Strain Relief: .41 Ref [10.4]

Assembled Height with Plastic Strain Relief: .565 Ref [14.35], .64 Ref [16.3]

Inch [mm]

Tolerance Unless Noted			
	.0	.00	.000
Inch	±.1	±.01	±.005

[] Dimensions for Reference only

Notes:

- This polarizing groove is non-existent on 3385 and 3473 Series.
- The optional high cable-profile cover for cable thicker than .040 [1.02] (does not have cable exit recess).
- The low profile strain relief can be used with the 4600 Series Plug and .1 x .1 Headers with ejector latches. The latches will only function as an ejector.
- See TS-0721 for mating post pattern.

Ordering Information

Sockets

XXXX-XXXX

Socket Series: See Table for 3M Part Number

Cover: 6 = Open End (For Daisy Chaining or Bussing)
7 = Closed End (For End Cable Termination)
8 = Open End for Higher Profile Cables (60 Pos Only)
9 = Closed End for Higher Profile Cables (60 Pos Only)

Polarization: 0 = Military (Dual Slot)
6 = Centerbump and Military

Strain Relief: 00 = No Strain Relief
XX = "Contact Quantity" for Plastic Strain Relief (i.e. 50 for a 50 Position Strain Relief)

Strain Relief (Order Separately)

3448-X0XX

Type: 2 = Low Profile (Metal)
3 = Plastic

XX = "Contact Quantity" See Table (i.e. 50 for a 50 Position Strain Relief)

See TS-0720

Keying Plug (Order Separately)

3435-0

Pull Tabs (Order Separately)

3490-X

TS-0718-06
Sheet 2 of 2

2.2 The connector at cern store

CERN Stores Catalogue

SCEM Code: Keyword(s):

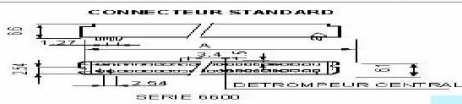
Search

← 09.55.02 Group: 09.55 → 09.55.03.B

09.55.03.A- FLAT CABLE CONNECTOR - SOCKET CONNECTOR - 2,54 x 2,54 mm

Technical information : [product manager](#)

Buy	SCEM Code	Unit	Unit Price	Nb. CONTACTS	A mm	B mm	TYPE 3M	FIG.
	09.55.03.310.0	PC	0.99	10	17,3	14,0	3473-6600	1
	09.55.03.314.6	PC	0.99	14	22,4	19,1	3383-6600	1
	09.55.03.316.4	PC	1.15	16	24,9	21,6	3452-6600	1
	09.55.03.320.8	PC	1.10	20	30,0	26,7	3421-6600	1
	09.55.03.326.2	PC	1.25	26	37,6	34,3	3399-6600	1
	09.55.03.334.2	PC	1.35	34	47,8	44,5	3414-6600	1
	09.55.03.340.4	PC	1.85	40	55,4	52,1	3417-6600	1
	09.55.03.350.2	PC	1.65	50	68,1	64,8	3425-6600	1
	09.55.03.360.0	PC	2.00	60	80,8	77,2	3364-6600	1
	09.55.03.364.6	PC	3.10	64	85,8	82,5	7964-6500	1
	09.55.03.410.7	PC	0.32	10	17,3	-	3448-3010	2
	09.55.03.414.3	PC	0.27	14	22,4	-	3448-3014	2
	09.55.03.416.1	PC	0.29	16	24,9	-	3448-3016	2
	09.55.03.420.5	PC	0.29	20	30,0	-	3448-3020	2
	09.55.03.426.9	PC	0.29	26	37,6	-	3448-3026	2
	09.55.03.434.9	PC	0.27	34	47,8	-	3448-3034	2
	09.55.03.440.1	PC	0.29	40	55,4	-	3448-3040	2
	09.55.03.450.9	PC	0.29	50	68,1	-	3448-3050	2
	09.55.03.460.7	PC	0.29	60	80,8	-	3448-3060	2
	09.55.03.464.3	PC	0.43	64	85,8	-	3448-7964	2



Appendix 3 – TIS approval of connectors

3.1 Connectors' IS41 compliance

Subject: RE: safety evaluation for the connectors "3M -series 3473-6600"
used un RB DCS cables
Date: Fri, 19 Mar 2004 09:15:16 +0100
From: Jonathan Gulley <Jonathan.Gulley@cern.ch>
To: Fabio Montecassiano <Fabio.Montecassiano@cern.ch>,
<pierluigi.paolucci@na.infn.it>
CC: Emilie Freret <Emilie.Freret@cern.ch>

Hello Fabio,
These connectors are IS41 compliant.
Best Regards
Jonathan

-----Original Message-----

From: Fabio Montecassiano
Sent: Thursday, March 18, 2004 6:59 PM
To: Jonathan Gulley; pierluigi.paolucci@na.infn.it
Subject: safety evaluation for the connectors "3M -series 3473-6600"
used un RB DCS cables

Dear Jonathan,

please evaluate the IS41 compliance for the connectors
3M socket series 3473-6600
used in the following CMS's RPC barrel DCS cables

* RB.CA.t-sens - at detector side -	310 pieces
* RB.CA.dcs-7 - at both sides -	1240 pieces
* RB.CA.dcs-10 - at both sides -	360 pieces

GRAND TOTAL IN ALL 5 WHEEL	1910 pieces

Note that this connector is sold at CERN STORE, SCEM 09.55.03.310.0.

Best regards
Fabio Montecassiano

3.2 C1 approval

Da: Fritz.Szoncso@cern.ch
Inviato: Tuesday, April 13, 2004 4:24 PM
A: pierluigi.paolucci@na.infn.it
Oggetto: Re: CMS RPC T-sensor C1 approval

Hello Pierluigi,

no design details violating CERN Code C1 were found.

Kind regards

Fritz Szoncso

CERN E1 Safety

----- Original Message -----

Subject: R: CMS RPC T-sensor C1 approval
 Date: Wed, 7 Apr 2004 14:29:11 +0200
 From: pierluigi.paolucci@na.infn.it
 To: pierluigi.paolucci@na.infn.it, szoncso@mail.cern.ch
 CC: antonio.ranieri@ba.infn.it, Fabio.Montecassiano@cern.ch

Sorry but when it is not 1mA/K but 1microA/K and so the average current is 300 microA.

Pigi

dott. Pierluigi Paolucci
 Istituto Nazionale di Fisica Nucleare
 Complesso Universitario di Monte San. Angelo
 Via Cintia, Edificio G, 80100 NAPOLI
 Tel: +39-081-676839
 Fax: +39-081-676346

On Wed, 7 Apr 2004 13:03:44 +0200 pierluigi.paolucci@na.infn.it wrote:

> Dear Fritz,
 > following the request of CMS GLIMOS I'm sending you the operating
 > conditions for the cable in subject
 > <https://edms.cern.ch/document/456571>
 > in order to get the C1 approval and so proceed with PRR.
 >
 > The T-sens for the Muon Barrel RPC is the AD592B (Analog Device).
 > http://www.analog.com/UploadedFiles/Data_Sheets/136700329AD592_a.pdf
 > AD592: Low Cost, Precision IC Temperature Transducer Data Sheet (Rev.A,
 > 7/93)(pdf)
 >
 > It is a Current Output - Precision IC Temperature Transducer providing
 > 1 mA/K corresponding to an average output current of 300 mA.
 >
 > They are placed on the RPC chamber and connected using an internal
 > cable 3 mt long to the output connector.
 >
 > The internal cable is a CERN cable (SCEM 04.21.51.055.4) with 2
 > conductors (Tinned copper) with a cross section of 0.22 mm².
 >
 > The output connector is a 3M: 4610-6600 (SCEM e' 09.55.04.510.0.)
 >
 > The external cable is the same of the internal cable (screened calbe)
 > and is 10-20 mt long.
 >
 > The screen will be connected to the RPC chamber safety ground.
 >
 > On the chamber side it will be equipped with a 3M connector (10 pins)
 > 3473-6600 (SCEM 09.55.03.310.0)
 > http://multimedia.mmm.com/mws/mediawebserver.dyn?eeeeee048qtezIfeSIfeeeRB8Q9F_bEv
 >
 > On the opposite side It will be connected to a CAEN ADC/DAC board
 > (32-64 channel) that is now under development. The CAEN connectors
 > have not jet decided and I hope to give you more info asap.
 >
 > Best regards
 > Pierluigi
 >
 > -----
 > dott. Pierluigi Paolucci
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