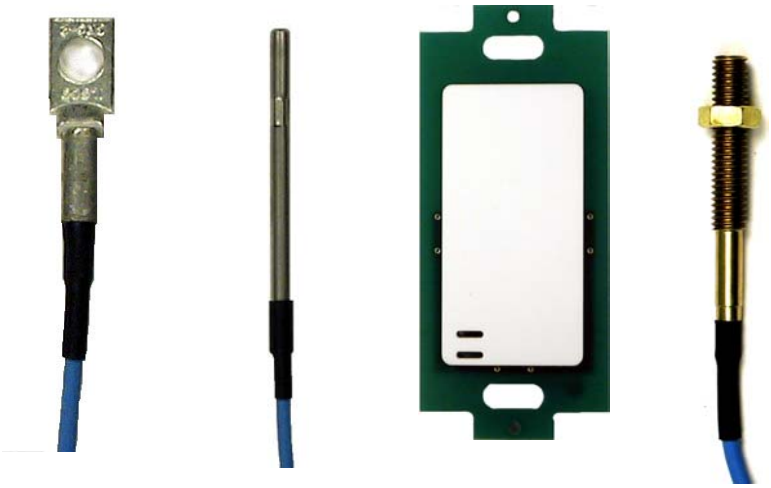
mTS01x Series
Temperature Sensors



Document No. 10449, Revision C

February 2007

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Revision Notes

First Release – May 22, 2003

Revision A March 18, 2005

- Update drawing 10543 to Revision A

Revision B May 10, 2006

- Update for new sensors and drawings

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1. Overview

The mTS01x Series of temperature sensors are fully digital, addressable temperature sensors. The sensors are constructed using the Dallas 1-Wire® DS1820 series of temperature sensing integrated circuits. Each sensor has a unique digital address.

The sensors are packaged in an industrial grade housing utilizing a fully potted design. Each sensor comes complete with two meters of heavy-duty industrial cable rated for use in direct sunlight. Refer to the sensor specifications in this manual for the safe operating temperature range for each type of sensor. The ratings given in the specifications are absolute maximum ratings and must not be exceeded. They are complete with a strain relief connector and an RJ-11 plug for quick connection to the sensor bus. The sensors connect to the Field Interconnect for quick diagnostics and field replacement.

The sensors are intended for installation as part of a complete temperature monitoring system. The entire system has been specified by CMCIEL. Components of the system include:

- mTS011, mTS012, mTS013, mTS014 and mTS015 Temperature Sensors
- mBC081 and mBC082 Bus Converters
- mTB001, mTB005 and mTB006 Field Wiring Interconnects
- mTI085 Panel Meter Operator Interfaces
- mOI215 Browser Based Operator Interface

These sensors are rated Intrinsically Safe when used with the mBC081 Bus Converter.

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2. Installation Instructions

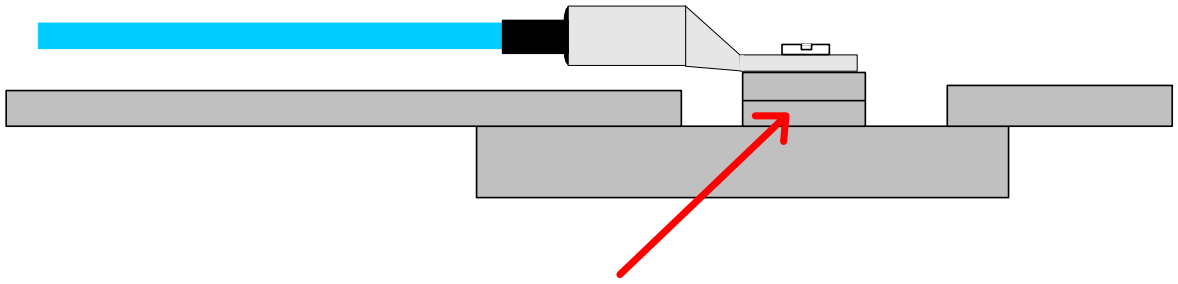
2.1 General Installation Information

The temperature sensors are designed for installation in an industrial environment. A reliable system will take into account the following:

1. All wiring will be protected from physical damage and abuse;
2. Wiring for this system is low voltage data wiring and should be segregated as much as possible from line voltage wiring. The wiring must not be installed next to cables from noise generating equipment such as VFD's and other motor control equipment;
3. The sensors will be mounted so they can be serviced without dissembling the device they are monitoring;
4. The temperature of the monitored device must not exceed the maximum ratings for the sensor;
5. The system will be installed using CMCIEL approved wiring and interconnect devices to the specifications included with the product manuals for each device. All drawing notes will be complied with;
6. If the installation is to be Intrinsically Safe, all requirements set out in documents for the mBC081 Bus Converter must be followed.

The sensors can be mounted on any clean, dry surface. The sensors are designed for all weather mounting, but should not be intentionally immersed in water for long periods. The sensor cable is rated for use from –60°C to +125°C and is UV stabilized for use in direct sunlight.

Take care not to damage the sensor during installation. Do not modify the sensor housing in any way. Do not bend the tab or barrel of lug style sensors. See drawing below for details if offset mounting is required.



Use washers or spacers to offset the sensor. Do not bend or twist the lug.

2.2 Installation on Conveyors and Bucket Elevators

Important Safety Notice

The correct operation of hazard monitoring sensors is highly dependant on installation. The correct location for the mounting of the temperature sensors is specific to each conveyor or bucket elevator. It is the sole responsibility of the installer and operator of the monitoring system to ensure that the sensors are correctly placed to ensure accurate detection of belt and pulley tracking faults.

2.2.1 General Information

- There is considerable debate within the industry regarding the use of brass rub blocks. Brass rub blocks provide the fastest response to off track conditions. Each conveyor/bucket elevator system typically requires a specifically designed brass rub block. The main concern with brass blocks is wear. Some degree of belt tracking error always occurs during each revolution of the belt. This minor tracking error is not sufficient to heat the brass rub block to the alarm point. The contact can however wear a slot in the block over time. This narrow slot can damage the belt or splice and eventually may prevent the block from detecting a real off track hazard. With the advent of differential systems, some elevator operators are now using carriage bolts or direct trunking contact instead of brass rub blocks in some applications.
- The use of carriage bolt style or direct trunking heat detection methods should only be contemplated when using differential temperature measurement. Differential systems compare the temperature of the left and right side of the conveyor and alarm when a modest change in temperature is detected, typically 10 – 20^{o}C. Systems that use fixed temperature alarming should use sensors that are in direct contact with the belting as they may cause the trunking temperature to increase beyond safe levels before activating.
- When placing the sensors, be aware that cases have occurred where the drive or idler pulley has shifted on the shaft. In these cases, the belt has remained on track and the pulley has contacted the conveyor trunking. Ensure that the final mounting location for the sensor will detect both belt and pulley hazards.
- It is recommended that main bearing and motor temperature sensors also be deployed.

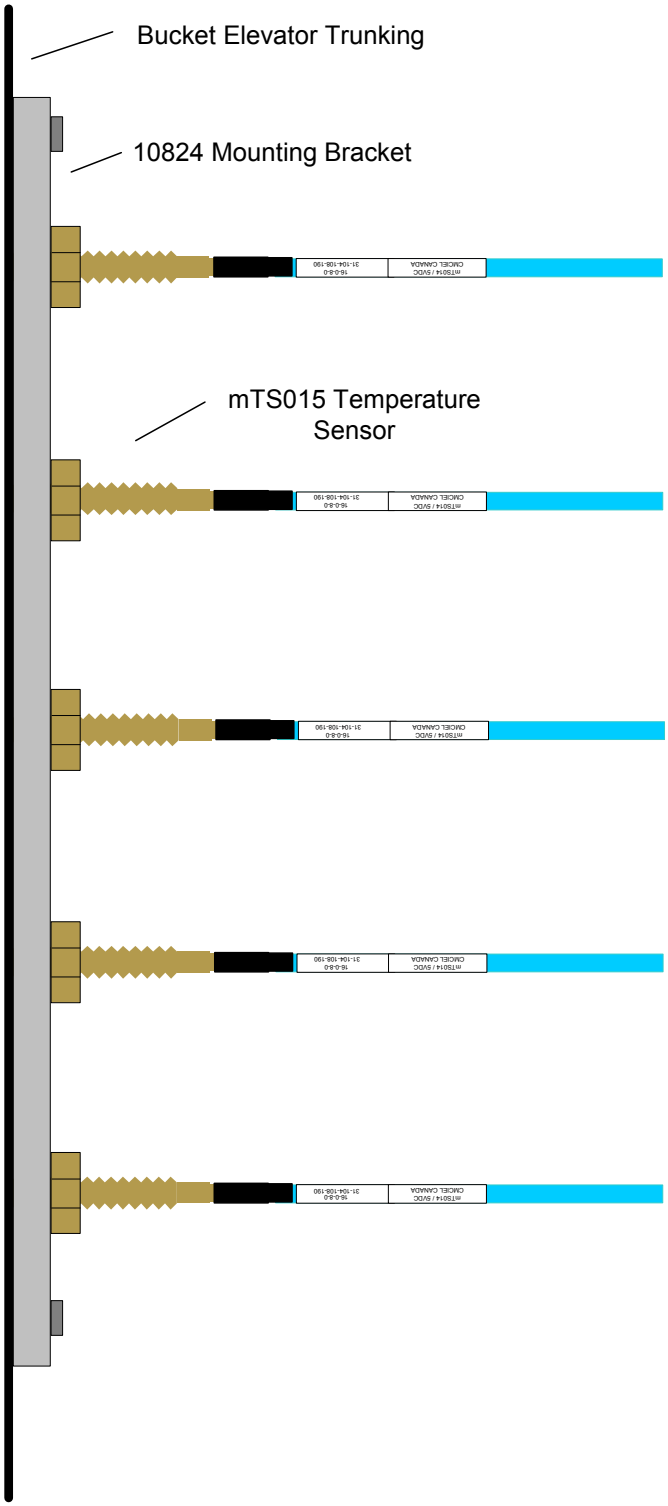
- Hazard monitoring systems must be routinely inspected, typically every 30 days, to ensure that excessive rub block wear has not occurred and that all sensors are correctly positioned and functioning as designed.

2.2.2 Fully Enclosed Conveyors

- Follow the recommendations of the conveyor manufacturer if available.
- Typical Tail End installations utilize a brass rub block at the adjustable tail end of the conveyor. The sensor is attached to or built into the rub block. Ensure that the rub block is positioned to detect the off-track condition. On some conveyors, the conveyor trunk is smaller than the tail section. Be sure the block will be contacted before the belt tracks against the trunk section of the conveyor. Rub blocks that are too wide will cause frequent false alarms.
- Typical Head End installations use a large carriage bolt attached to the trunking. The rounded head of the bolt is mounted inside the conveyor. The sensor is attached on the outside of the trunking to the carriage bolt. The most effective way to determine the sensor location is off track the belt and install the sensor at the position where the belt contacts the trunking.

2.2.3 Bucket Elevators

- Follow the recommendations of the bucket elevator manufacturer if available.
- Bucket elevators with gravity tensioning can have large areas of possible contact near the lower pulley area. To cover this large area a special bar assembly has been designed, part no. 10824. This bar can accommodate up to 5 mTS015 sensors. The sensors are threaded into the plastic bar until they touch the metal housing of the boot. The bar is positioned to parallel and directly over the belt travel near the boot. This system provides superior coverage for moving boot gravity pickup bucket elevators.
- The best method to accurately position the sensor is to off track the belt and determine the contact point. Place the sensor to track this point vertically as the tail section is adjusted. This monitoring method require direct belt to trunk friction for off track detection and may not be suitable for all installations.
- Typical Head End installations use a large carriage bolt attached to the trunking. The rounded head of the bolt is mounted inside the bucket elevator trunking. The sensor is attached on the outside of the trunking to the carriage bolt. The most effective way to determine the sensor location is off track the belt and install the sensor at the position where the belt contacts the trunking.


Bucket Elevator Trunking
10824 Mounting Bracket
mTS015 Temperature Sensor

Example of multiple temperature sensors for gravity take-up bucket elevators using the 10824 Mounting Bracket

3. Safety Warning for Intrinsically Safe Systems

IMPORTANT NOTICE

This product is Intrinsically Safe when used with the mBC081 Bus Converter. Do not modify the cable or any of the system components in any way. Install the system using the drawings provided with the mBC081 Bus Converter Technical Manual. Do not install sensors or components other than those specified by the manual. Follow the field wiring instructions provided. Only use the wiring components and cabling specified in the manual.

Intrinsically Safe wiring must be fully segregated from all other wiring systems. Do not use the same cable trays, conduits or pathways for Intrinsically Safe cabling. Follow the requirements of the local electrical code for all elements of the installation.

Do not attempt to service or repair individual components. Return defective components to the factory for repair.

Failure to follow the installation instructions provided in the mBC081 Technical Manual and the requirements of the local electrical code could result in an explosion or fire.

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4. Specifications

4.1 Common Specifications

Description	Characteristic
Sensor bus	
Voltage	5 VDC
Current	1.5mA max
Communications	1-Wire® Bus
Environment	
Absolute Maximum	-55 to 125°C (-65 to 255°F)
Recommended Operating Range	-40 to 105°C (-40 to 225°F)
Relative Humidity	0 to 95% non-condensing

4.2 Dimensions

Sensor	Length	Width	Height / Depth	Hole Size	Cable Length
mTS011-1/4	63mm (2.5”)	14mm (0.55”)	11mm (0.45”)	7mm (0.275”) (for 1/4" bolt)	2m (80”)
mTS011-3/8	63mm (2.5”)	14mm (0.55”)	11mm (0.45”)	11mm (0.44”) (for 3/8” bolt)	2m (80”)
mTS011-1	71mm (2.75”)	25mm (1.0”)	25mm (1.0”)	11mm (0.44”) (for 3/8” bolt)	2m (80”)
mTS012-4	102 mm (4.0”)	6mm (0.25”)	6mm (0.25”)	6mm (0.25”) (1/4” tube style)	2m (80”)
mTS014	125mm (4.1”)	45mm (1.75”)	20mm (0.80”)	For Leviton Decora® faceplates	100mm (4”)
mTS015	76mm (3.0”)	10mm (0.375”)	10mm (0.375”)	3/8” brass threaded rod for rub-blocks	2m (80”)

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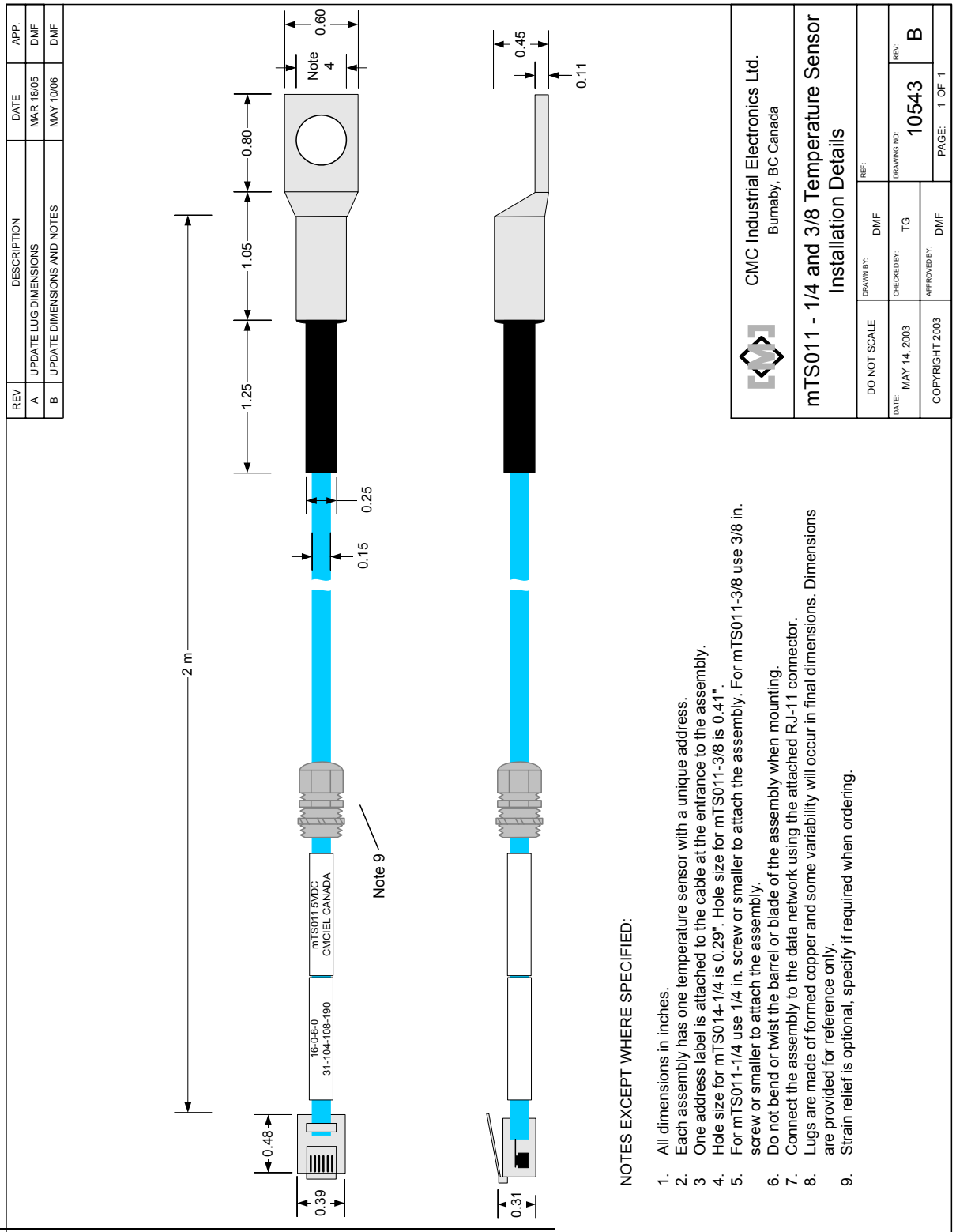
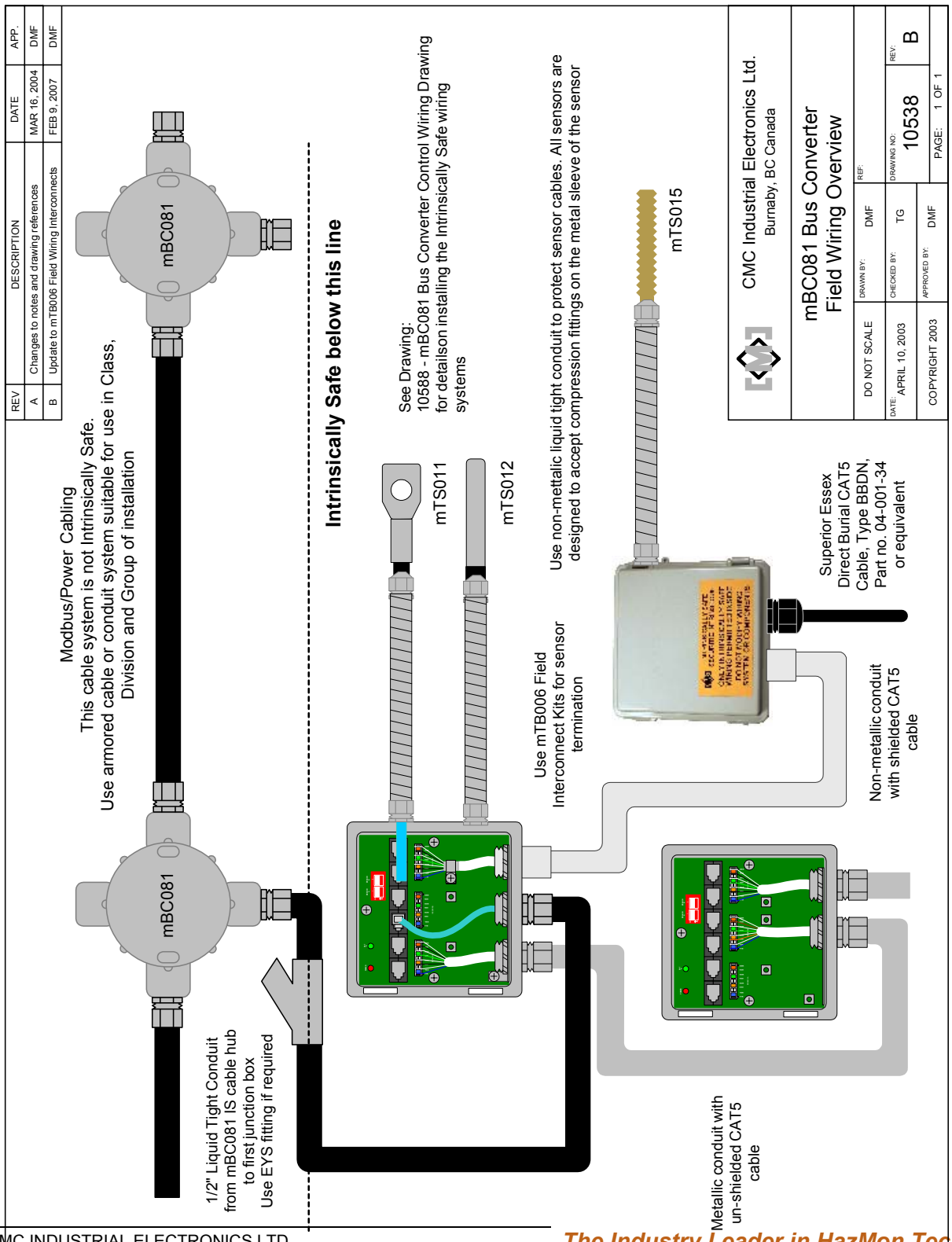
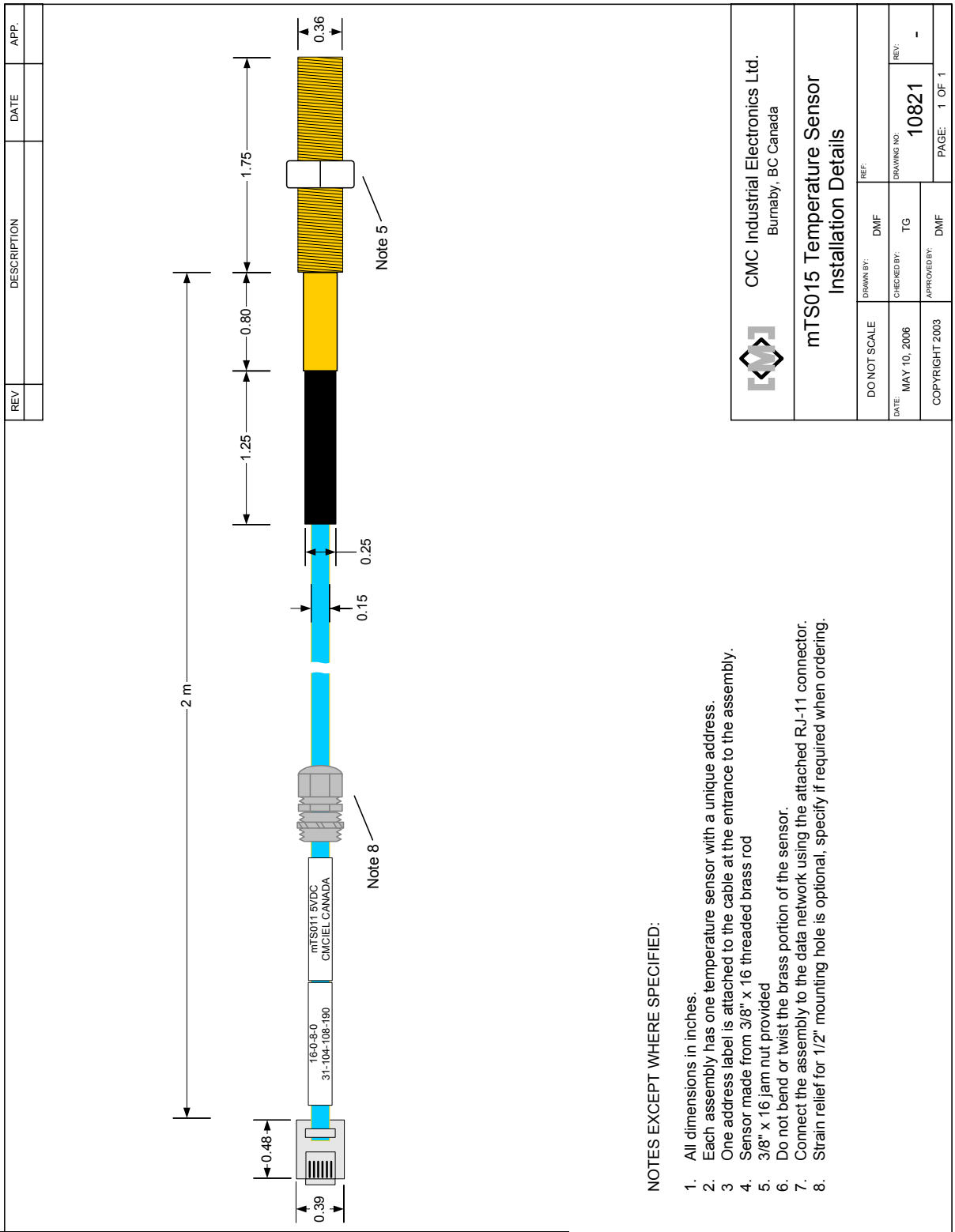
Appendix 1 – Installation Drawings

The following is a list of the installation drawing in this appendix:

10543B	mTS011 1/4 and 3/8 Temperature Sensor Installation Details
10538B	mBC081 Bus Converter Field Wiring Overview
10821	mTS015 Temperature Sensor Installation Details
10822	mTS012 Temperature Sensor Installation Details
10823	mTS014 Temperature Sensor Installation Details
10824	Bucket Elevator Temperature Sensor Mounting Bracket

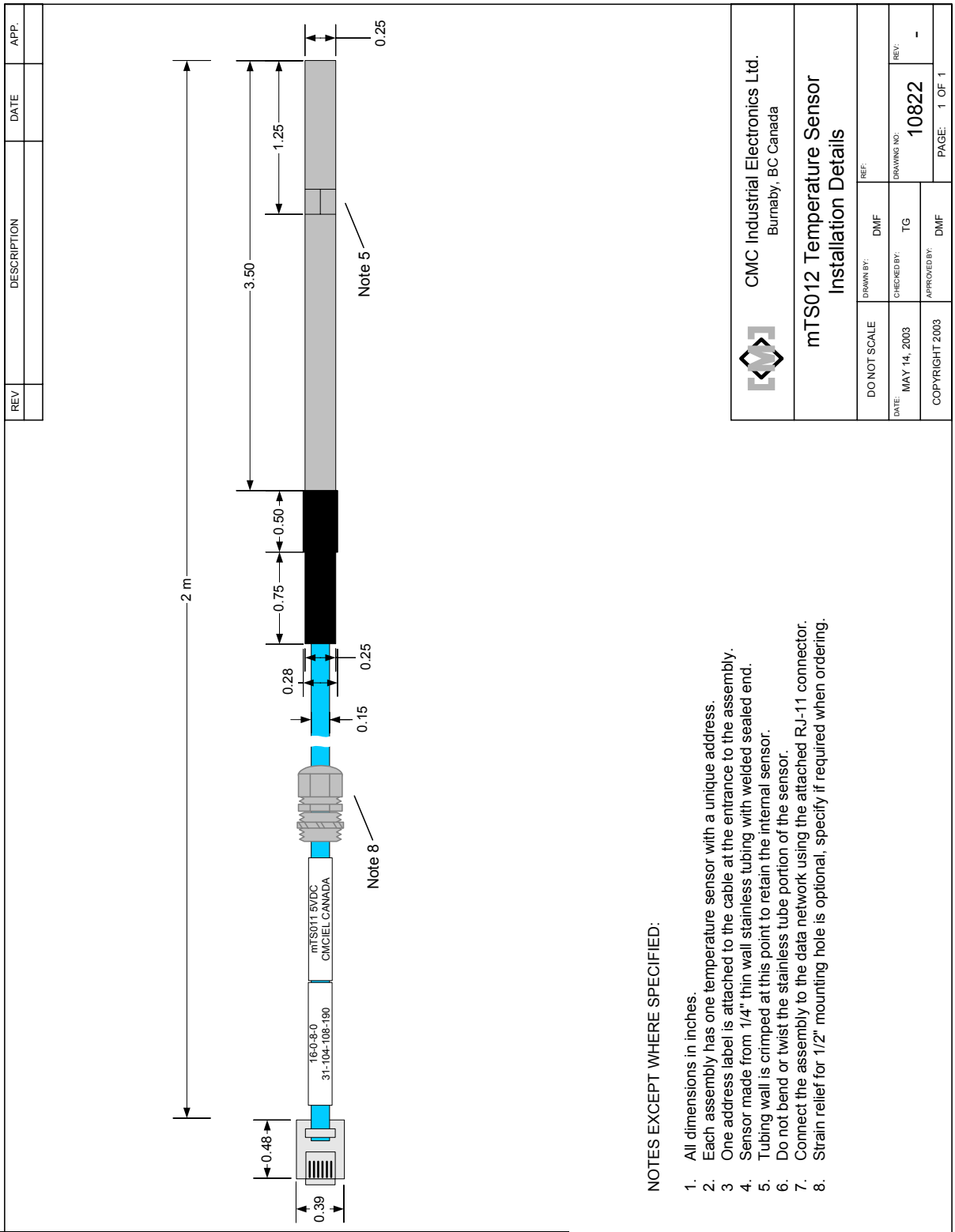

REV
DESCRIPTION
DATE
APP.
A
UPDATE LUG DIMENSIONS
MAR 18/05
DMF
B
UPDATE DIMENSIONS AND NOTES
MAY 10/06
DMF
2 m
0.80
1.05
1.25
0.60
Note 4
0.25
0.15
0.45
0.11
0.48
0.39
0.31
16-0-8-0
31-104-108-190
mTS011 5VDC
CMCIEL CANADA
Note 9
NOTES EXCEPT WHERE SPECIFIED:
1. All dimensions in inches.
2. Each assembly has one temperature sensor with a unique address.
3 One address label is attached to the cable at the entrance to the assembly.
4. Hole size for mTS014-1/4 is 0.29". Hole size for mTS011-3/8 is 0.41".
5. For mTS011-1/4 use 1/4 in. screw or smaller to attach the assembly. For mTS011-3/8 use 3/8 in. screw or smaller to attach the assembly.
6. Do not bend or twist the barrel or blade of the assembly when mounting.
7. Connect the assembly to the data network using the attached RJ-11 connector.
8. Lugs are made of formed copper and some variability will occur in final dimensions. Dimensions are provided for reference only.
9. Strain relief is optional, specify if required when ordering.
CMC Industrial Electronics Ltd.
Burnaby, BC Canada
mTS011 - 1/4 and 3/8 Temperature Sensor Installation Details
DO NOT SCALE
DRAWN BY: DMF
REF:
DATE: MAY 14, 2003
CHECKED BY: TG
DRAWING NO: 10543
REV: B
COPYRIGHT 2003
APPROVED BY: DMF
PAGE: 1 OF 1


REV
DESCRIPTION
DATE
APP:
A
Changes to notes and drawing references
MAR 16, 2004
DMF
B
Update to mTB006 Field Wiring Interconnects
FEB 9, 2007
DMF
Modbus/Power Cabling
This cable system is not Intrinsically Safe.
Use armored cable or conduit system suitable for use in Class, Division and Group of installation
mBC081
mBC081
Intrinsically Safe below this line
See Drawing:
10588 - mBC081 Bus Converter Control Wiring Drawing
for detailson installing the Intrinsically Safe wiring systems
mTS011
mTS012
mTS015
Use non-mettalic liquid tight conduit to protect sensor cables. All sensors are designed to accept compression fittings on the metal sleeve of the sensor
Use mTB006 Field Interconnect Kits for sensor termination
Superior Essex Direct Burial CAT5 Cable, Type BBDN, Part no. 04-001-34 or equivalent
Non-metallic conduit with shielded CAT5 cable
1/2" Liquid Tight Conduit from mBC081 IS cable hub to first junction box Use EYS fitting if required
Metallic conduit with un-shielded CAT5 cable
CMC Industrial Electronics Ltd.
Burnaby, BC Canada
mBC081 Bus Converter
Field Wiring Overview
DO NOT SCALE
DRAWN BY: DMF
REF:
DATE: APRIL 10, 2003
CHECKED BY: TG
DRAWING NO: 10538
REV: B
COPYRIGHT 2003
APPROVED BY: DMF
PAGE: 1 OF 1



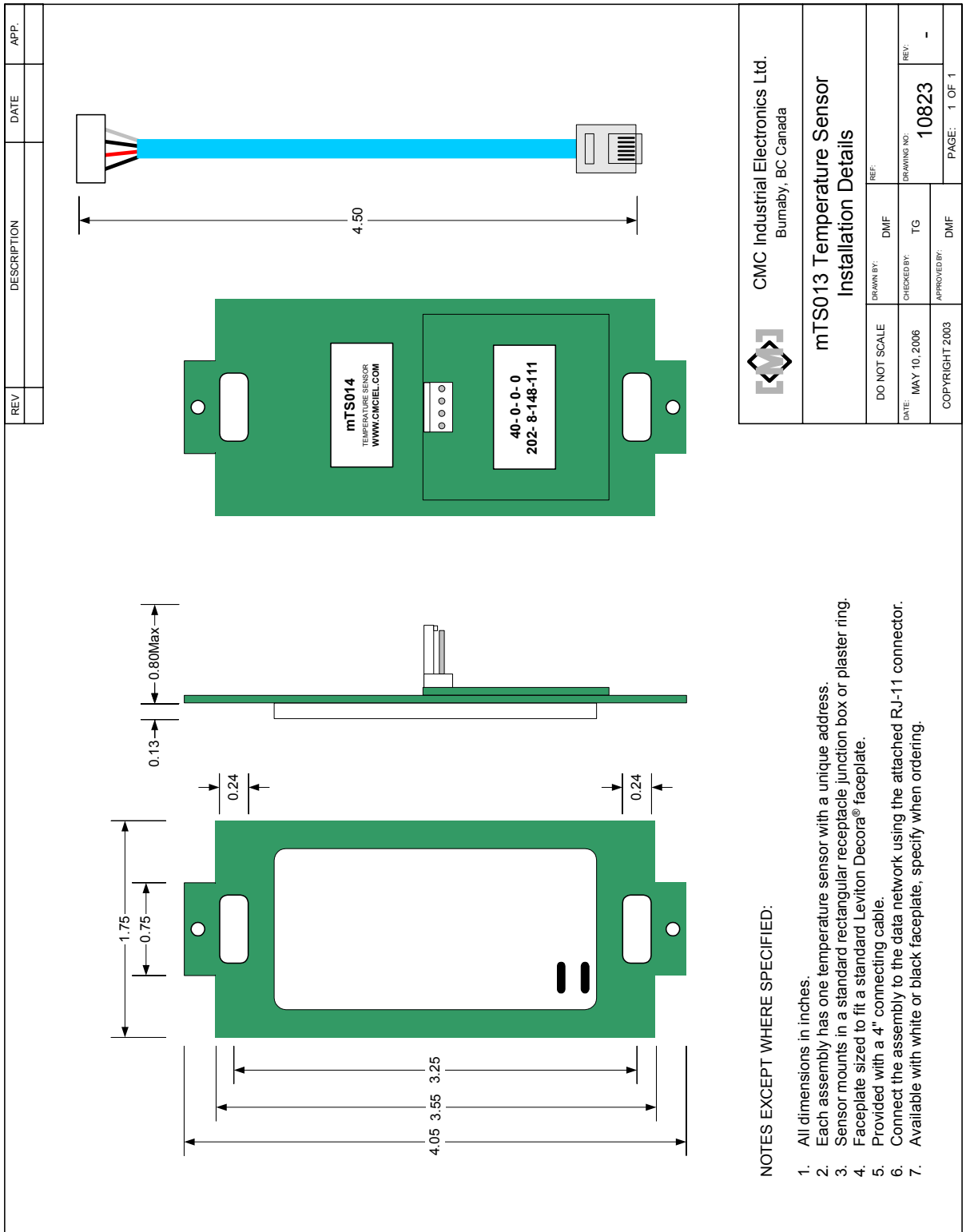
NOTES EXCEPT WHERE SPECIFIED:

1. All dimensions in inches.
2. Each assembly has one temperature sensor with a unique address.
3. One address label is attached to the cable at the entrance to the assembly.
4. Sensor made from 3/8" x 16 threaded brass rod
5. 3/8" x 16 jam nut provided
6. Do not bend or twist the brass portion of the sensor.
7. Connect the assembly to the data network using the attached RJ-11 connector.
8. Strain relief for 1/2" mounting hole is optional, specify if required when ordering.



NOTES EXCEPT WHERE SPECIFIED:

1. All dimensions in inches.
2. Each assembly has one temperature sensor with a unique address.
3. One address label is attached to the cable at the entrance to the assembly.
4. Sensor made from 1/4" thin wall stainless tubing with welded sealed end.
5. Tubing wall is crimped at this point to retain the internal sensor.
6. Do not bend or twist the stainless tube portion of the sensor.
7. Connect the assembly to the data network using the attached RJ-11 connector.
8. Strain relief for 1/2" mounting hole is optional, specify if required when ordering.



NOTES EXCEPT WHERE SPECIFIED:

1. All dimensions in inches.
2. Each assembly has one temperature sensor with a unique address.
3. Sensor mounts in a standard rectangular receptacle junction box or plaster ring.
4. Faceplate sized to fit a standard Leviton Decora® faceplate.
5. Provided with a 4" connecting cable.
6. Connect the assembly to the data network using the attached RJ-11 connector.
7. Available with white or black faceplate, specify when ordering.

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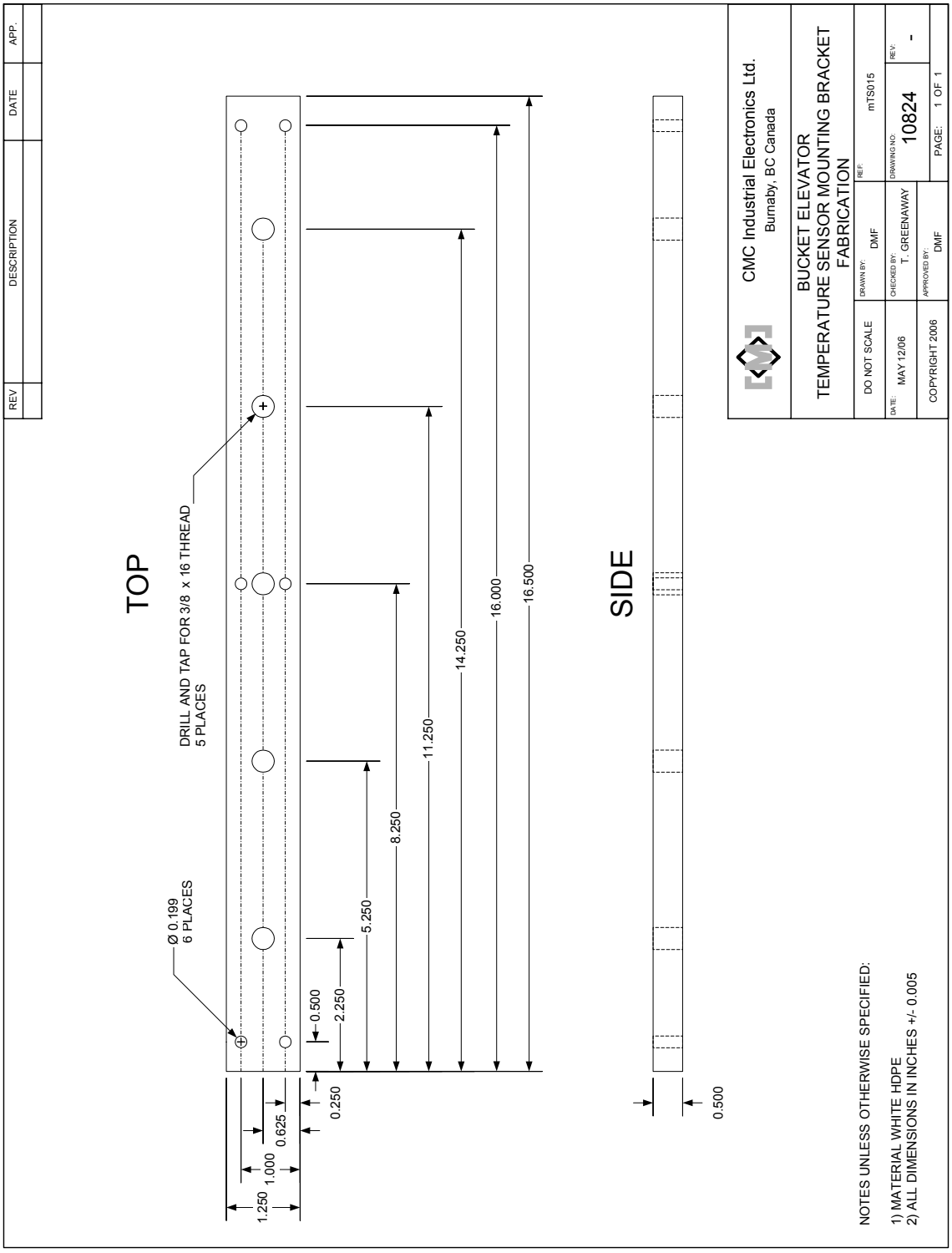
REV
DESCRIPTION
DATE
APP.
TOP
SIDE
DRILL AND TAP FOR 3/8 x 16 THREAD
5 PLACES
Ø 0.199
6 PLACES
0.500
2.250
5.250
8.250
11.250
14.250
16.000
16.500
0.250
0.625
1.000
1.250
0.500
CMC Industrial Electronics Ltd.
Burnaby, BC Canada
BUCKET ELEVATOR
TEMPERATURE SENSOR MOUNTING BRACKET
FABRICATION
DO NOT SCALE
DRAWN BY: DMF
REF: mTS015
DATE: MAY 12/06
CHECKED BY: T. GREENAWAY
DRAWING NO: 10824
REV: -
COPYRIGHT 2006
APPROVED BY: DMF
PAGE: 1 OF 1
NOTES UNLESS OTHERWISE SPECIFIED:
1) MATERIAL WHITE HDPE
2) ALL DIMENSIONS IN INCHES +/- 0.005

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