



Temperature Systems: Portable Reader

INSTALLATION INSTRUCTIONS





Table of Contents

Purpose	3
Tools and Supplies Required.....	3
Introduction	4
Properly Installing Cables.....	4
Cable Bottom Anchoring.....	7
Perforated Floor	7
Flat Storage Buildings	7
Hopper Bottom Bin or Silo.....	7
Temperature Cable Numbering	8
External Conduit and Leadwire Installation.....	9
Selecting Conduit Size.....	11
CRS Box Mounting Procedure	12
Pulling Leadwire Through Conduit.....	13
Splicing Leadwire in the CRS Box	13
System Troubleshooting	15
Detailed OHM Testing and Troubleshooting.....	15
Amphenol Plug Wiring Sequence	17
Terms and Conditions of Sale	19



Purpose

These instructions provide guidance for the installation of a Safe-Grain, Inc. temperature cable system with a portable reading instrument in a steel grain bin / silo with a flat bottom or hopper bottom.

These instructions are intended for persons with skills in the installation and assembly of grain storage bins / silos, and familiar with the necessary Personal Protective Equipment (PPE) and safe climbing requirements for a safe job site.

Tools and Supplies Required

- Personal Protective Equipment (PPE)
- Drill or screw gun
- Bits and socket drivers
- ¼" Self-tapping screws
- Conduit cutting and assembly tools
- Conduit and fillings
- Hole punch for conduit
- Lineman's pliers or Safe-Grain Professional Crimp Tool
- Screwdrivers
- Electrical tape
- Cable ties
- Cable anchoring materials
- Ohmmeter



Introduction

Thank you for your purchase of a Safe-Grain temperature detection system. The installation of temperature detection cables in steel bins and silos varies depending on the manufacturer. All cables must be installed according to the manufacturer's recommended specifications.

IMPORTANT: Safe-Grain temperature systems will include an installation drawing with specific information for your system. Please use the drawing as your primary instruction and refer to this instruction manual for the details referenced on the drawing. Please do not hesitate to contact Safe-Grain during normal business hours (toll free 800-659-8250, or 513-398-2500, or email info@safegrain.com) if you have any questions about our recommended installation of cables while the roof is built at grade elevation.

Safe-Grain, Inc. temperature cables are prefabricated with appropriate hardware and leadwire to extend from the top of the cable to the bin/steel silo roof peak, exit through the roof near the peak and continue down the roof slope and sidewall to near grade level. Reading outlet plug(s) mount in a Central Reading Station (CRS Box) located approximately 4' [1.2 meters] above the bottom of the bin near grade. Please contact Safe-Grain regarding questions about locating the CRS box in a remote location from the bin. Cables are read with a battery powered portable instrument. Please contact Safe-Grain for portable instrument and software options. Specify the exact type of bin or silo, diameter, eave and overall height, the type of floor, and roof slope in degrees when ordering.

Properly Installing Cables

The following general information is based on standard installation guidelines. Please note that the bin manufacturer's specifications may supersede the instructions in this manual. We strongly recommend that the temperature cables are installed when the steel bin roof is assembled prior to the side walls being erected. If the cables are not installed while the roof structure is a grade level, the cables can only be installed at a later date when the bin is full of grain or by erecting scaffolding. This means that the operator may not obtain grain temperature readings the first time the bin/ silo is filled.

IMPORTANT: It is up to the cable installer to follow the bin manufacturer's requirements on cable installation and cable brackets or cable supports. The bin roof and sidewalls may be damaged by the pull of the cables if the cables are not properly installed. Prevent roof and sidewall damage by following the bin manufacturer's recommendations for cable supports and cable locations.

IMPORTANT: You will need a Myers¹™ hub with LB, gasket, LB cover, and nipple conduit fittings when the roof and first ring are completed and you start the temperature cable system installation. Your installation drawing or the conduit chart on Page 8 will provide the conduit diameter required. SAFE-GRAIN, INC.

General: There are several types of steel bins and it is possible that parts of these instructions may be modified to fit your bin. Proper caution should be used in handling the cables and the leadwire: avoid tangling, crushing, cuts, and knots. Protect the wires from welding splatter, too. A damaged cable or leadwire will not

¹ Myers™ is a trademark of Cooper Technologies Company or its subsidiaries in the USA and / or other countries.



work. Cables should be identified and located by the cable identification tag located at the top of the cable. DO NOT REMOVE THE TAG FROM THE CABLE.

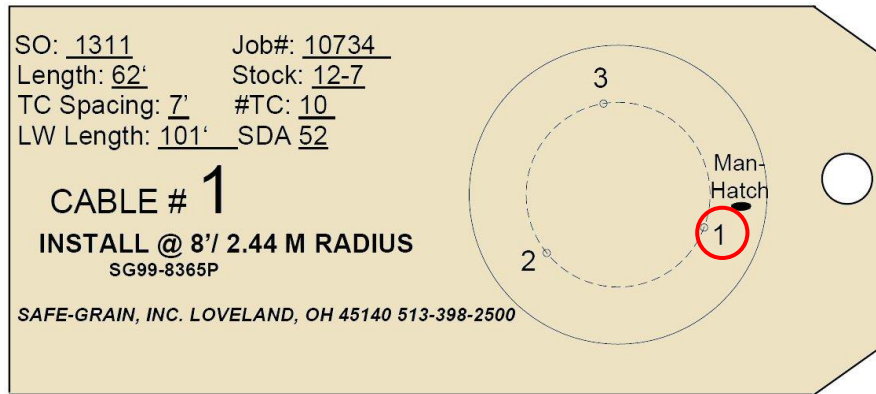


Figure 1 Typical Cable Tag- DO NOT REMOVE FROM THE CABLE

1. Locate the position for the respective cables on the bin/ silo roof making sure the cables and/or leadwires will not be located in the grain stream while the bin/ silo is being filled.
2. Install cables according to the bin manufacturer's recommended specifications. ATTENTION: The manufacturer usually specifies the location of the temperature cables. It is up to the cable installer to follow the bin manufacturer's requirements on cable installation and cable brackets or cable supports.
3. Attach the eyebolt, strain relief clamp, or quick link to the roof truss or cable support. See Figure 2.
4. Tape the leadwire to the hanger (eyebolt or clamp). Leave enough slack in the leadwire for the cable to swing without pulling the leadwire cable splice apart. See Figure 2.
5. If eyebolts are used- eyebolts must be perpendicular to the ground and not at the roof angle. Hill washers may be used to keep the eyebolt perpendicular. Screw one nut down on the eyebolt to the bottom of the eyebolt thread. Place the eyebolt through the hole (in the cable support) where the cable should be hung and secure with a second washer and nut. If the roof itself is drilled through; seal to prevent water leaks.
6. Note: The eye on the eyebolt must run parallel not perpendicular to the roof truss.



- **ALL CABLES MUST BE INSTALLED AND SUPPORTED PER THE BIN / SILO MANUFACTURER'S REQUIREMENTS**
- Hang strain relief clamp from bin / silo manufacturer cable bracket or from eyebolt (eyebolt not shown). Spread cotter pin after installation.
- **STRAIN RELIEF CLAMPS AND / OR EYEBOLTS MUST BE VERTICAL** Use "Hill" washers with eyebolts if required to maintain vertical installation.
- Tape leadwire into slack loop.
- Secure Leadwire As Shown. **KEEP LEADWIRE OUT OF GRAIN.**
- Cable Tag Will Show Cable and Leadwire Lengths and Installation Location. **DO NOT REMOVE TAGS.**
- Recommended cable attachment for all floors (see Figure 3). Using bottom loop for flat floor tie down. Secure with light line or twine. Countersink concrete anchor eyelet to avoid bin sweep

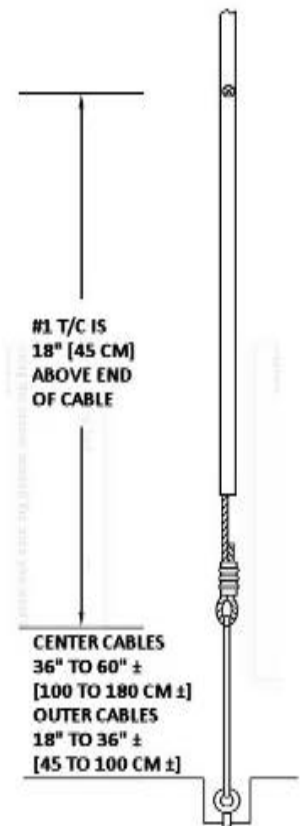
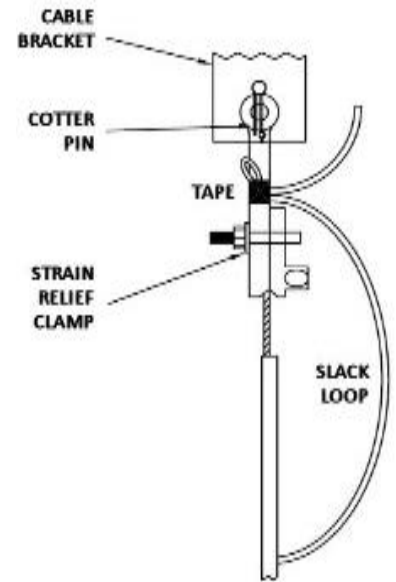


Figure 2



Cable Bottom Anchoring

Perforated Floor

Make a wire loop and secure with light line or twine

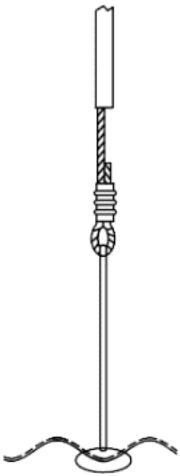


Figure 3

Flat Storage Buildings

Anchor to a flat plate resting on the floor

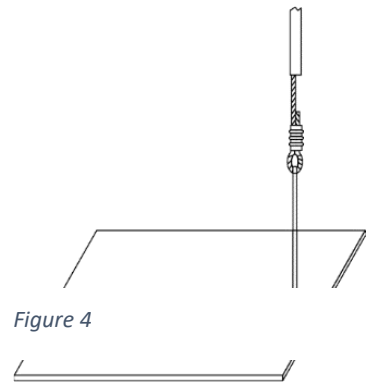


Figure 4

Hopper Bottom Bin or Silo

Use a 3 lb. [1.5 k] sash weight in hopper silos ONLY if allowed by the silo manufacturer

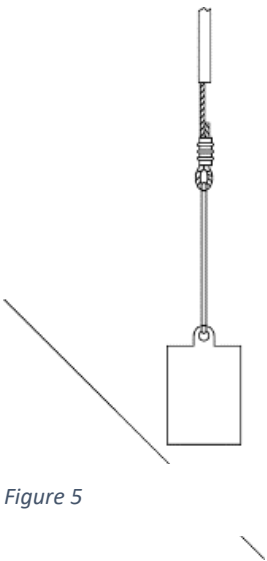


Figure 5

Temperature Cable Numbering

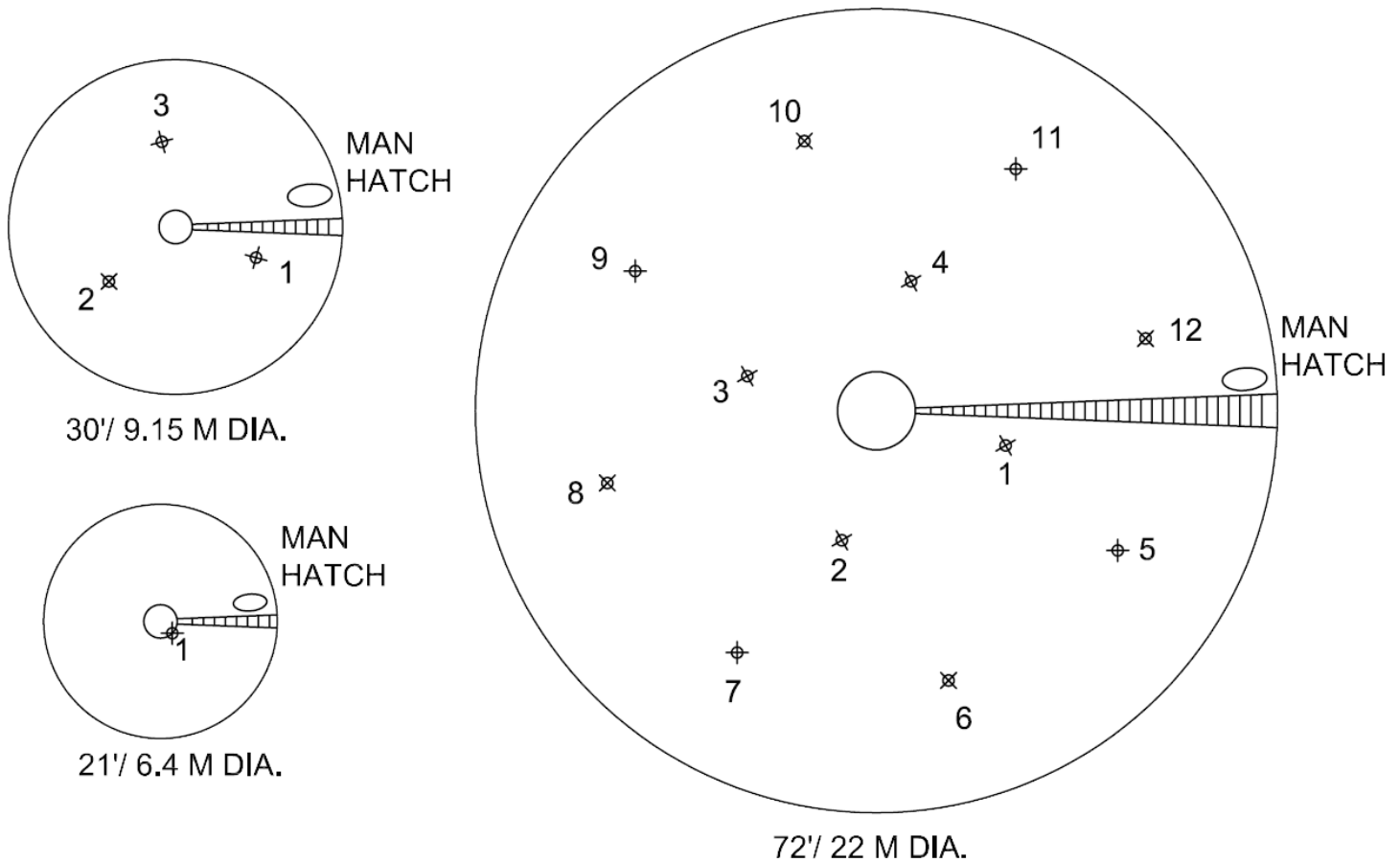


Figure 6 Temperature Cable Numbering

Standard identification of temperature cables is as follows for steel bins or silos:

- See Figure 6 Temperature Cable Numbering
- Cables are numbered in a clockwise orientation starting at the center and moving to the outer wall
- The center cable OR first cable clockwise from the Roof Ladder / Man Hatch is always Cable #1
- **Locate cables as distant from unloading points as possible!**
- **Follow the manufacturer's cable installation instructions!**
- Identify the end of the leadwire with the cable number so the leadwire may be properly identified when the leadwire-to-reading plug splices are made at the Central Reading Station (CRS).

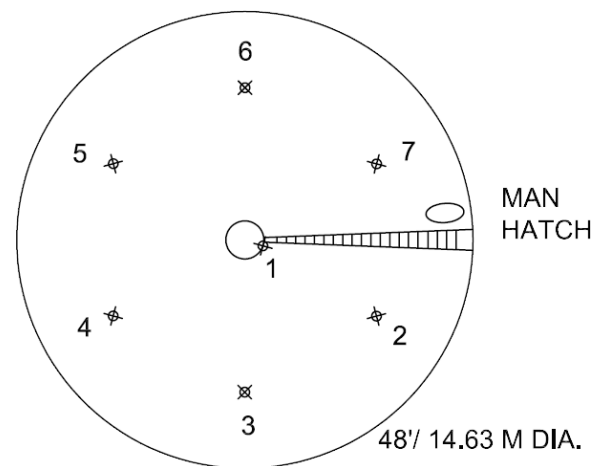


Figure 7



- Run the leadwires to the peak of the roof in such a manner that they will not be in the grain stream or sag into the grain. The rib of the roof offers a convenient run for the leadwire.
- **IMPORTANT:** Leadwire that comes in contact with the grain will probably be damaged and will not work.
- Bring leadwires through the roof by installing a MYERS™ hub or weatherproof splice box of sufficient size for all the leadwires. It is extremely important to seal the roof opening to prevent leakage. Avoid potential cable failure by avoiding cuts or pinching of the leadwire (such as by the roof cap). Coil leadwire outside the roof to protect from damaging the wire during the installation.
- **IMPORTANT:** After the bin / silo is completed and before filling with grain, the cables should be secured to the bin / silo floor to keep cables vertical during grain storage use. Cables that are kept vertical will last much longer than cables that are allowed to “float” as the bin / silo is filled. Your temperature readings will be more accurate too.
- Before the bin or silo is filled, attach the bottom cable loop to the bin floor.
 - Flat bottom silo – concrete floors. See Figure 2.
 - Flat storage building option. See Figure 4.
 - Perforated aeration floor. See Figure 3.
 - Hopper bottom silos. See Figure 5 (steel and concrete).

External Conduit and Leadwire Installation

General: The leadwire supplied for each cable is sufficient to locate the CRS box approximately 4’ [1.2 meters] above the bottom of the bin/ silo near grade. Leadwire may be extended to locate the CRS box to a different location. Leadwire may be spliced as many times as required without affecting the quality of the temperature readings. Please contact Safe-Grain if additional leadwire and crimps are required to relocate the CRS box.

We recommend rigid conduit to prevent damage to the external leadwires from weather, rodent, or physical damage. Thin wall conduit is usually used for inside runs not exposed to the weather and **must** not be used outside. Aluminum conduit is subject to distortion over time and may separate at connection points which will allow water entry and system damage.

PVC conduit is not recommended since it will break and cracks at direction change locations.

If PVC conduit is used the installer must use flexible connections such as SEALTITE® Liquid Tight Flexible Metallic Conduit at any direction change location such as the roof to eave location etc.

System damage caused by water or ice in a cracked or broken PVC, thin wall, or aluminum conduit system will not be covered under Warranty policy.

Avoid any source of high voltage to avoid inductance “pick-up” that may affect temperature readings. Use general electrical requirements for fittings, supports, expansion joints, etc. See Figure 8 Rigid Conduit Installation Please provide an offset or short horizontal run on vertical runs over 60’ [20 M] tall.

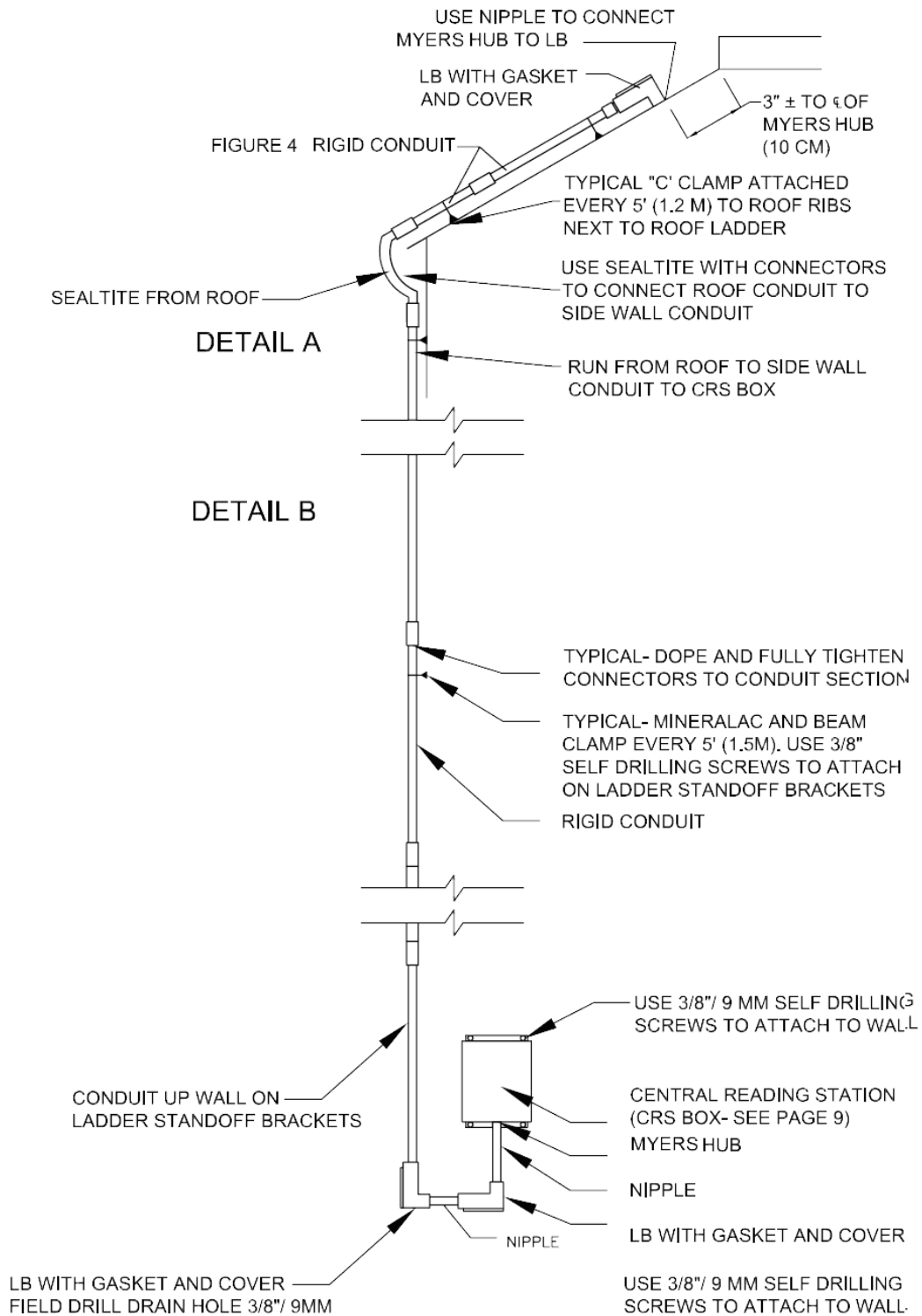


Figure 8 Rigid Conduit Installation



Selecting Conduit Size

Using the correct conduit will simplify the installation. Conduit and fitting diameters should be based on the number of leadwires and the following table.

CONDUIT CAPACITY BY DIAMETER

Leadwire Size	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"
	[16 MM]	[21 MM]	[27 MM]	[35 MM]	[41 MM]	[53 MM]
6 T/C Leadwire	6	14	20	40	60	85
12 T/C Leadwire	3	5	11	20	30	44
18 T/C Leadwire	3	5	10	18	27	40

Figure 9 Conduit Capacity by Diameter

After the roof and one ring of the bin are completed

Install the temperature detection cables in the silo per the silo manufacturer's requirements, Safe-Grain installation drawing, and section 2 of the Safe-Grain "Portable Temperature System Instructions." Please remember to identify the leadwire ends to indicate the cable location for each leadwire end.

Start the conduit installation by installing a Meyer™ hub with nipple connected to an LB (with the gasket and cover open) at a location near the roof peak next to the roof ladder. See Figure 8 Rigid Conduit Installation. Pull all identified leadwires from the inside of the silo to the outside of the silo through the LB cover opening. Keep the leadwires pulled out the LB gasket opening at this time. Do not run the leadwire in any conduit at this time. Leadwire will be run in conduit after the roof and all rings are completed.

After the roof and all rings of the bin are completed

Install all roof and side wall conduit. See Figure 8 Rigid Conduit Installation. Please inspect the conduit ends, remove any rough or sharp edges, and clean all conduit ends to avoid nicking or damaging the leadwires as they are pulled through the conduit. Remember to dope and fully tighten the conduit connectors.

IMPORTANT: Always bring leadwires into the CRS box through the side or bottom of the enclosure to stop water from running on to the top of the enclosure. Drill a 3/8" [9 mm] weep hole to drain condensation from the bin / silo. See Figure 8 Rigid Conduit Installation.



Central Reading Station Installation

The Central Reading Station (CRS) should be located at a non-obstructed, convenient area for easy access. The standard leadwire supplied for each cable is sufficient to locate the CRS box approximately 4' [1.2 M] above the bottom of the bin / silo near grade.

- A. Use 0.25" [6 mm] self-drilling screws to mount CRS box to bin / silo.
- B. Use "B" screws to mount reading panel to CRS box standoffs.

Bring conduit through the bottom (preferred and recommended) or side of the CRS Box – **NOT THROUGH THE TOP!**

Drill a hole in the bottom of the CRS box or LB conduit fitting to drain condensation

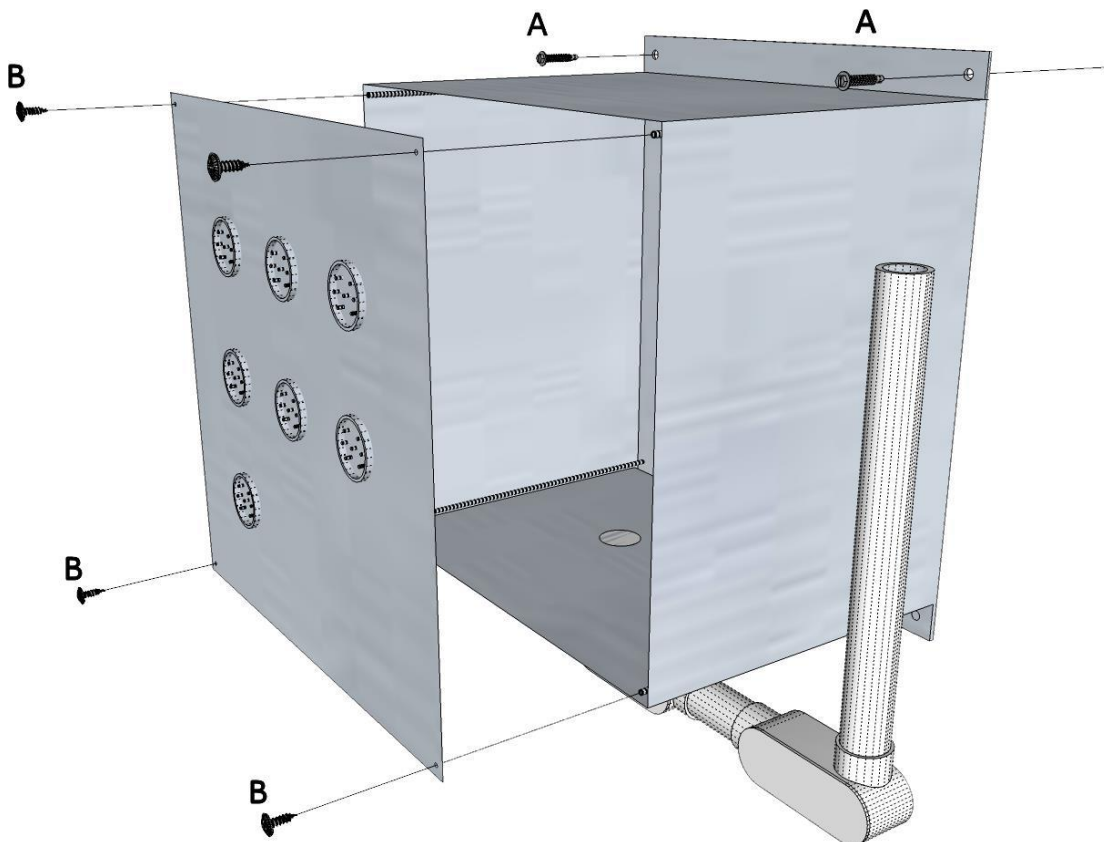


Figure 10 CRS Box

This example shows seven (7) reading plugs. There is one plug for each cable. Three (3) cables will have three (3) reading plugs. Eleven (11) cables will have eleven (11) reading plugs, etc.

CRS Box Mounting Procedure

Mounting Procedure: Remove the reading plug panel from the box. Drill a conduit entry hole in the bottom (preferred) or side of the box. Size the conduit entry hole to 3/8" [9 mm] larger than the conduit size being used. (Example: 3/4" [20mm] conduit plus 3/8" [9 mm] = 1-1/8" [29 mm] hole size.) Mount box to the sidewall of bin with 1/4" [6 mm] self-tapping screws. See Figure 10 CRS Box. **Do not install reading plug panel until splicing is completed.**

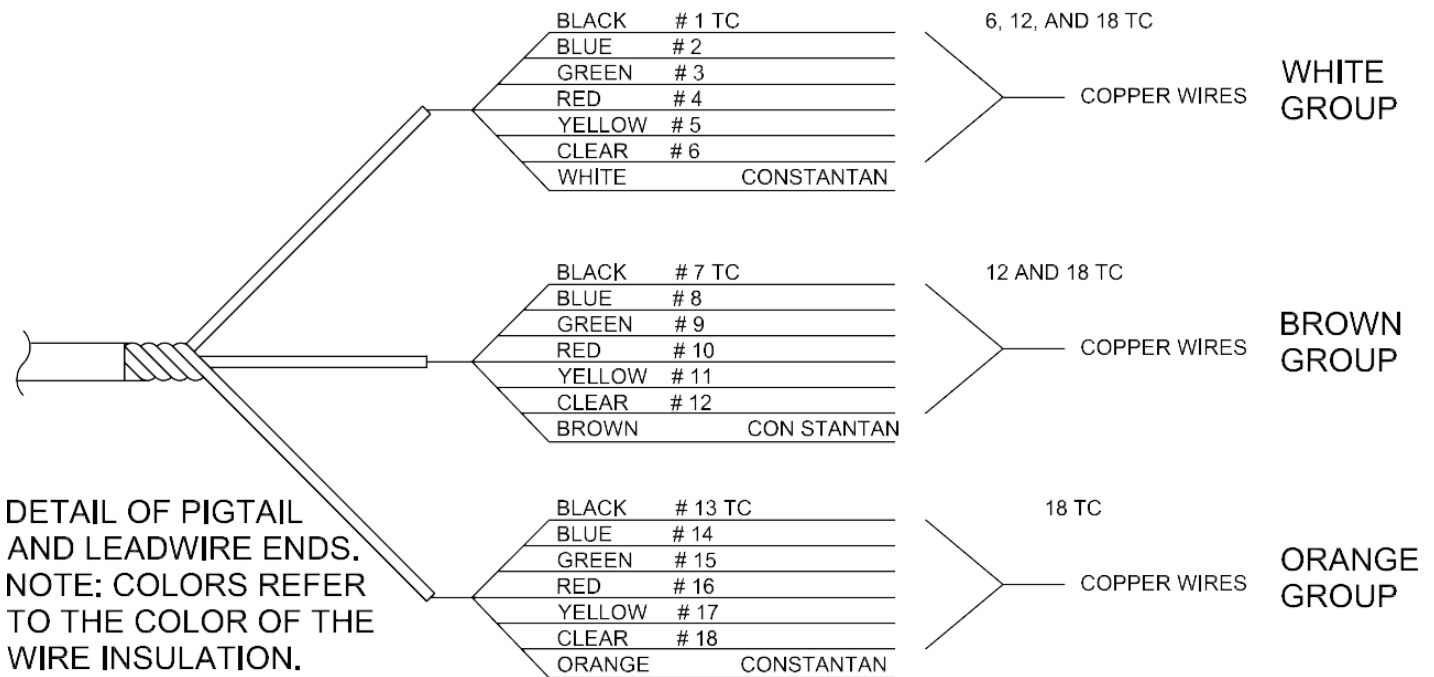


Figure 11 CRS and Leadwire Detail

Pulling Leadwire Through Conduit

Leadwire is used to carry the signal generated by the cable thermocouples or TCs to the reading plug outlet. DO NOT cut, nick or damage the leadwire. Avoid knots, tangles, or crushing.

Pulling all wires at the same time makes the job easier. Pull all leadwire(s) from the peak through the conduit and into the CRS box enclosure. Move up the Brady tags or cable number identification tags before cutting any excess leadwire. Keep a 3' [1 meter] length of extra leadwire per cable inside the CRS box.

Splicing Leadwire in the CRS Box

Simply stated, a good splice means a correct reading; a poor splice means an inaccurate or no reading at all. **MAKE SURE ALL LEADWIRES ARE PULLED INTO THE CRS BOX, NOT JUST THE CONDUIT, BEFORE SPlicing.**

IMPORTANT:

- You do **NOT** need to strip the insulation from the ends of the wires before crimping / splicing!
- Use SAFE-GRAIN supplied crimps only!
- Do **NOT** use 3M™ BRAND SCOTCH LOK™² connectors- they will **NOT** work.
- Do **NOT** use “local” or “telephone” wire to extend the leadwires.
- Please contact SAFE-GRAIN during normal business hours at 1-800-659-8250, 513-398-2500, or info@safegrain.com if additional crimps or leadwire is required.

² 3M™ and SCOTCHLOK™ are trademarks of the 3M Company



The wires are spliced color-to-color and group-to-group. See Figure 11. Each pair of wires is inserted into Safe-Grain supplied grease filled connector crimp. See Figure 12 to Figure 17. The grease retards corrosion and resists water, thus making a good insulated, conductive splice. The splice when completed is then taped to help retard water infiltration and make a neat appearance. The connectors may be crimped with a lineman’s pliers or a Safe-Grain professional crimp tool. Please contact us for pricing on crimp tools (1-800-659-8250, 513-398-2500 during normal business hours, or info@safegrain.com)

Locate the leadwire from cable #1 and the pigtail from the read-out plug for cable #1. The following steps are very important. Separate the individual groups on the leadwire and the pigtail about ¼” [30mm] past where the black jackets end so that the colors of each individual wire can be seen. Note that all groups have a black, blue, green, red, yellow, and clear (copper) wire plus another wire that will be the WHITE, BROWN, or ORANGE (constantan) or common wire.

- 6 TC Leadwires White common
- 13 TC Leadwires White and Brown commons
- 18 TC Leadwires White, Brown and Orange commons.

After separating the wires into their respective color groups, twist the wires together, color-to-color, one group at a time to keep the wires from being mixed up. Take a pair of side cutters and cut off the excess wire to about 6” [20 mm] longer than the black jacket covering. Take one twisted pair at a time from the same group, insert a crimp over the two ends, and crimp with the crimp tool. No stripping of the insulation is required. Be sure that the crimps are seated as far as possible on the two wires and that the tool crimps the connector completely! Continue crimping process until all pairs are crimped. Tape up the splice with a good grade of electrical tape. Tape back to the black outer jacket to prevent loosening and shorting of the wires. The splice or crimp is now complete. Gently coil up the slack on the leadwire, insert leadwire into the CRS box and install the reading plug panel. This process must be repeated for each cable and reading plug pair for the temperature cable system.

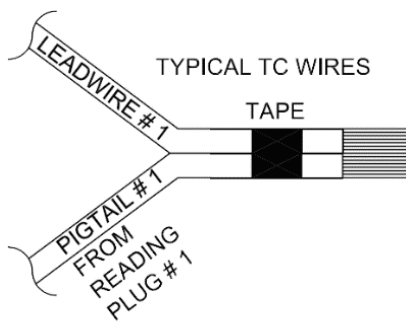
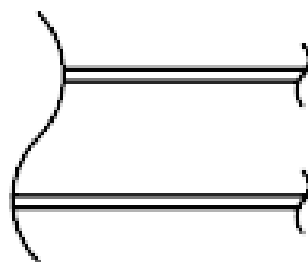
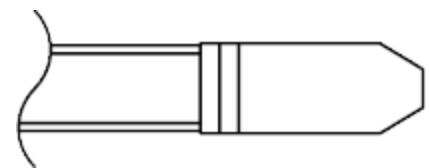


Figure 12



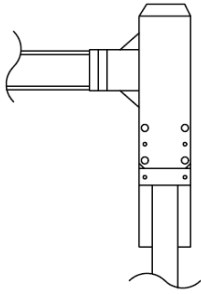
BLACK-BACK Wire of same length.
Do Not Strip Insulation!

Figure 13



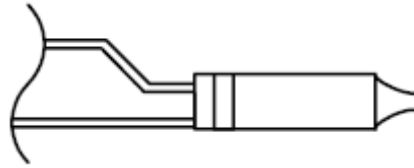
Insert wires fully into SAFE-GRAIN supplied crimp. **YOU MUST USE SAFE-GRAIN CRIMPS. DO NOT USE 3M BRAND SCOTCHLOK CONNECTORS**

Figure 14



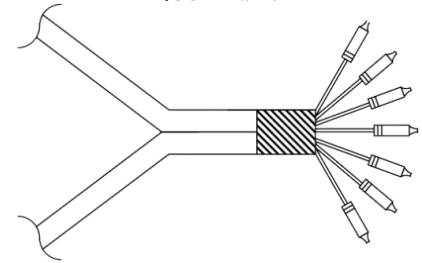
Use a Safe-GRAIN Crimp tool. Squeeze Crimp Tool until tool releases

Figure 15 Applied Crimp Tool



Completed BLACK- BLACK crimp / splice for White Group. Pull GENTLY on crimp to make sure that the wires remain in the plastic crimp. Repeat for all wires.

Figure 16 Completed crimp



Shows all splices crimped. Now tape back from black jackets of wires to the end of the splices.

Figure 17 Complete all crimps

System Troubleshooting

After all cables have been hung, all leadwires run in conduit, the CRS box mounted, all splices connected, and the reading plug panel reattached; all thermocouples should be checked.

This is done by plugging the portable instrument Amphenol Plug into each plug and reading each TC. If a TC does not read, check the splice for proper connection and re-splice if necessary. See splicing instruction on page 13.

Detailed OHM Testing and Troubleshooting

When trouble shooting, the best advice is to ensure that all connections, Amphenol reading plugs, leadwire, cables, and connections are secure and spliced correctly. Look for the most obvious cause of the problems and then proceed step by step beginning at the instrument and working back through to the reading plug, leadwire, and cable.

Please remember the system consists of a series of TC circuits on a temperature cable connected by leadwire to an Amphenol reading plug in the CRS box. These circuits are completed when the female receptacle plug of the instrument is inserted into the male Amphenol plug of the CRS box. Only 1 TC circuit is closed at any time whether control of the circuit is being made by the TC selector knob on the instrument, or is being sequentially read automatically through each TC circuit on an entire cable.

If all TC's on all cables are dead at the same time, the problem may be in the instrument. Check continuity between the common connection on the instrument receptacle in the jack handle (6 TC common - G, 12 and 18 TC common - M) and the other TC openings - A, B, C, etc. If there are open circuits in the instrument, please return the instrument to SAFE-GRAIN for repairs. Most problems are caused by physical damage to the equipment. Broken wires in the instrument, leadwires that have been pulled into the grain, water in conduit, too much pressure on any splice in a cable or cable-leadwire or leadwire-reading plug pigtail connection, pinching of any wire etc. can all cause



Figure 18 Amphenol Plug



shorts, breaks and dead spots in the cables. Since a complete circuit has to exist between all parts, any shorts any place in the system will cause invalid or no readings for the cable.

1. If a dead cable is suspected, please check all splices and wire runs for obvious causes and then retest. If the cable continues to be defective, start trouble shooting by isolating the problem. To test the individual Amphenol reading plug-leadwire - cable assemblies, put one probe of the OHM meter on the common pin of the plug being tested (6 TC common - G pin, 12 and 18 TC common - M pin) and one probe on the A pin to test the OHM resistance of the #1 TC. To test the OHM resistance of the #2 TC, leave one probe on the common pin and put one probe on the B pin. Continue with the C pin for the #3 TC etc. as shown on page 13. There should be about 1.1 OHM per foot or 3-4 OHM's per meter of leadwire-cable length. The #1 TC will have the most resistance since it has the greatest physical distance from the plug. The balance of the TC's will drop about 6-8 OHM's per TC reading. The OHM values themselves are not important. What is important is that any shorts, dead wires, and TC locations are found and verified.
2. If a short or dead spot is found, continue testing by:
 - a. Testing continuity for Amphenol reading plugs by checking continuity of each pin to the corresponding wire on the reading plug pigtail per page 14. If a shorted or dead Amphenol pin-wire connection is found, replace the reading plug or re-solder.
 - b. Test continuity of the leadwire for shorts or dead spots by testing each group of conductors (white, brown, and orange). If shorts or dead spots are found, they are caused by physical damage to the leadwire. Repair by either re-splicing color-to-color a broken leadwire or replacing the damaged section, again by re-splicing color to color within the white, brown, and orange group.
3. If problems with the temperature cable or leadwire are suspected:
 - a. Inspect all field splices and wire runs for obvious causes and correct. Re-splice as needed if a sensor is wired out of order, shorted, or a poor connection is found. If the cable continues to be defective inspect the factory-made connections at the top of the temperature cable.
 - b. Using an ohm meter, measure the resistance between each TC wire in the temperature cable and a common (white, brown, or orange) constantan wire in the same group. Insert the ohmmeter probes into the back of the splice connector to measure the resistance. The temperature cable wire with the highest resistance is TC #1 and can be any color. It must be spliced to the black wire in the leadwire white group. The temperature cable wire with the second highest resistance must go to the blue wire in the white group, etc. See the color codes in Figure 6. Color codes sequences always follow the same order: black, blue, green, red, yellow, clear. If TC #1 in the temperature cable is green, TC #2 will be red. Re-splice as needed if a sensor is wired out of order, shorted, or a poor connection is found. If any TC's on the cable are found to be shorted together or dead, the cable must be replaced.

NOTE: A cable with 8 TC will only have 8 copper wires to test. A cable with 14 TC will only have 14 copper wires to test, etc.

Please do not hesitate to contact SAFE-GRAIN, INC. if further help is required.

Phone: (513) 398-2500

Fax: (513) 398-2536

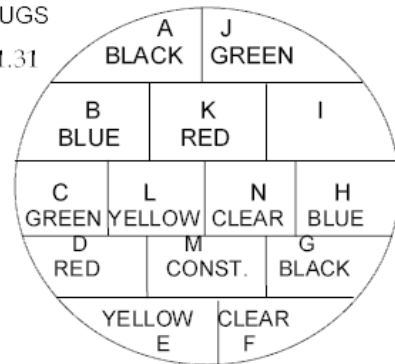
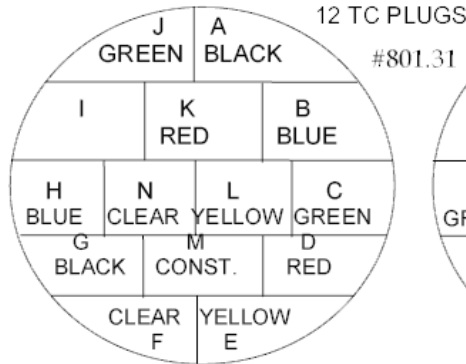
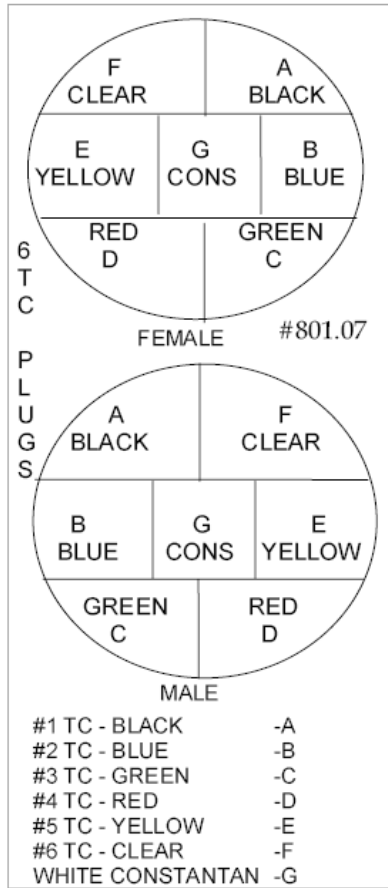
Toll-Free: (800) 659-8250

E-mail: info@safegrain.com

Website: www.safegrain.com



Amphenol Plug Wiring Sequence



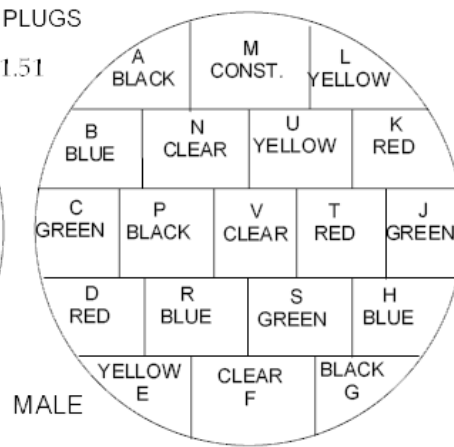
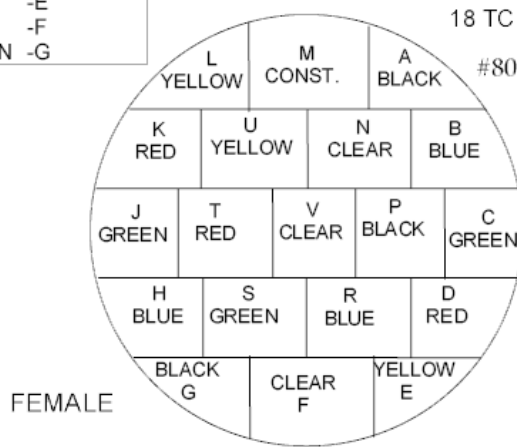
FEMALE
 WHITE GROUP

#1 TC - BLACK -A
 #2 TC - BLUE -B
 #3 TC - GREEN -C
 #4 TC - RED -D
 #5 TC - YELLOW -E
 #6 TC - CLEAR -F
 WHITE CONSTANTAN -M

MALE
 BROWN GROUP

#7 TC - BLACK -G
 #8 TC - BLUE -H
 #9 TC - GREEN -J
 #10 TC - RED -K
 #11 TC - YELLOW -L
 #12 TC - CLEAR -N
 BROWN CONSTANTAN -M

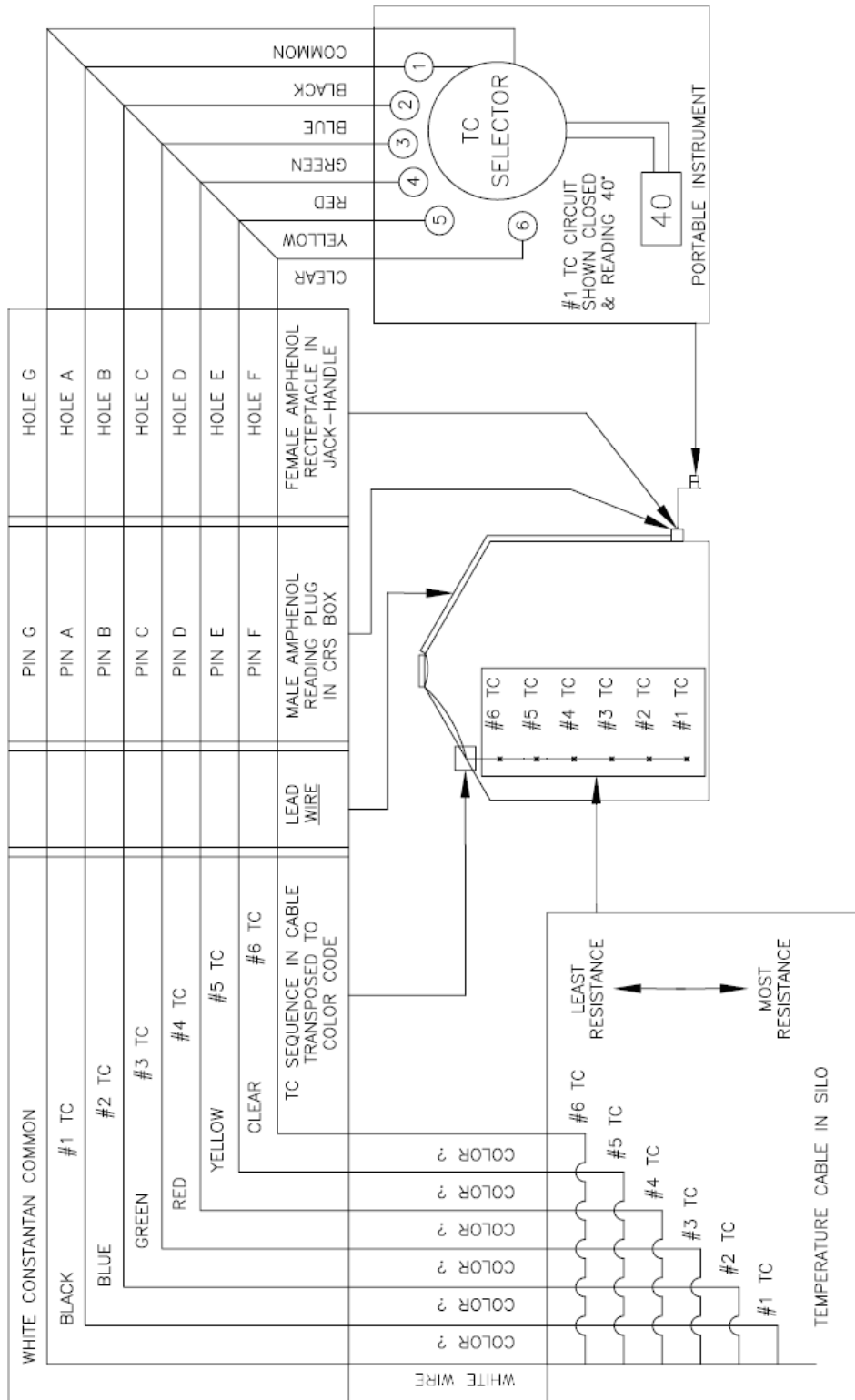
NOTE: I NOT USED



WHITE GROUP	BROWN GROUP	ORANGE GROUP
#1 TC - BLACK -A	#7 TC - BLACK -G	#13 TC - BLACK -P
#2 TC - BLUE -B	#8 TC - BLUE -H	#14 TC - BLUE -R
#3 TC - GREEN -C	#9 TC - GREEN -J	#15 TC - GREEN -S
#4 TC - RED -D	#10 TC - RED -K	#16 TC - RED -T
#5 TC - YELLOW -E	#11 TC - YELLOW -L	#17 TC - YELLOW -U
#6 TC - CLEAR -F	#12 TC - CLEAR -N	#18 TC - CLEAR -V
WHITE CONSTAN -M	BROWN CONSTANTAN -M	ORANGE CONSTANTAN -M



Typical Portable Reading Instrument Temperature System





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Terms and Conditions of Sale

Shipment is made F.O.B. Safe-Grain plant, unless another point of origination is designated on the face hereof, in which case shipment is F.O.B. at such point of origination. Unless specified by Buyer in writing, shipment shall be made by carrier of Safe-Grain's choice. No insurance is provided for the goods unless requested by Buyer prior to shipment, and satisfactory arrangements for payment are made between Buyer and Safe-Grain. This sale is subject to, and Safe-Grain shall not be responsible or liable for, delay directly or indirectly resulting from or contributed to by any foreign or domestic embargoes, seizures, acts of God, insurrection, war, the adoption or enactment of any law, ordinance, regulation, ruling or order, directly or indirectly interfering with or rendering more burdensome the production or delivery hereunder, lack of usual means of transportation, fires, floods, explosions, strikes or other accidents or contingencies beyond Safe-Grain's control, either of the forgoing nature or of any other kind, nature or description Safe-Grain's or its suppliers' plants or elsewhere or otherwise affecting transportation or production of the goods or any components used in or in connection with their production. Any delivery quotations are estimates only and the failure to comply therewith shall in no manner subject Safe-Grain to incidental or consequential damages resulting from failure to meet any such estimated or requested delivery date. All prices are subject to change without notice prior to acceptance of order by Safe-Grain, unless the same are stated in writing by Safe-Grain to be firm for a definite period of time.

All invoices are due and payable within the time specified on the face hereof, unless subsequently modified in writing by Safe-Grain. In addition to purchase price, Buyer shall pay Safe-Grain the amount of all governmental taxes, excises and/or other charges that it may be required to pay with respect to the production, sale or transportation of any goods delivered hereunder; except as otherwise provided by law.

Safe-Grain warrants that the goods, described on the face hereof are free from defects in the electronic components of the goods for a period of three (3) years from the date of shipment of the goods. Safe-Grain's obligation under this warranty is limited to repairing or replacing the electronic components of the goods. Buyer shall at Safe-Grain's request, return for repair or replacement of the components of the goods, freight prepaid. No other express warranty is given and no affirmation of Safe-Grain, by words or action, shall constitute a warranty. THIS WARRANTY IS EXPRESSLY IN LIEU OF ANY OTHER EXPRESS OR IMPLIED WARRANTIES INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY AND/OR WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE AND ANY OTHER OBLIGATIONS ON THE PART OF SAFE-GRAIN. Buyer's receipt of goods delivered hereunder shall be and constitute an unqualified acceptance thereof, and the waiver by Buyer of any and all claims with respect to such good other than a claim under the express warranty hereinabove set forth. Buyer assumes all risk and liability for the results and performance obtained by the use of the goods delivered hereunder. No claim of any kind, whether as to goods delivered or for non-delivery of goods and whether or not based on negligence, shall be in an amount greater than the purchase price of the goods described on the face hereof with respect to which such a claim is made. In no event shall either party be liable for consequential damages as defined in the Ohio Business and Commerce Code.

The risk of loss of the goods shall pass to Buyer as soon as the goods are properly loaded on the carrier shipping the same.

The terms and conditions on the face hereof and as set forth herein above shall constitute the entire agreement of the parties superseding any and all prior agreements, representations, communications, and/or understandings.

This contract shall be governed by and construed in accordance with the laws of the State of Ohio, and exclusive venue shall be in Clermont County, Ohio.

WARRANTY SGI 4042012