MIAMI-DADE COUNTY

MIAMI-DADE PUBLIC LIBRARY SYSTEM

ADDENDUM 10

Miami Lakes Library Branch

EXTERIOR IMPROVEMENTS AND COMPREHENSIVE INTERIOR RENOVATIONS

C23-MDPLS-02-ESP

2025

ADDENDUM NO. 10
17-JUL-2025

POJECT:	**Miami Lakes Library Branch** **Exterior Improvements and Comprehensive Interior Renovations** **6699 Windmill Gate Rd.,** **Miami, Florida 33014**
BID DUE DATE:	**6-AUG-2025 - Wednesday**
FROM:	Miami-Dade Public Library System (MDPLS) Capital Program Division 101 West Flager Miami, FL 33130
TO:	Prospective Bidders and Interested Parties

This Addendum forms part of the project solicitation documents and will be incorporated into the Contract Documents, as applicable. Insofar as the Original Contract Documents, Drawings and Specifications are inconsistent, this Addendum shall govern. Please acknowledge receipt of this Addendum, at the time of bid submittal to Miami-Dade County, in the space provided on the "Acknowledgement of Addenda Form" provided with the project solicitation documents. Failure to acknowledge receipt of all addenda may be cause for disqualification.

Miami-Dade County's "Cone of Silence", Section 2-11.1(t) of the Code of Miami-Dade County, approved by the Board of County Commissioners, specifically prohibits communication in regard to this bid solicitation with County staff except as allowed by the Code. The period covered by the "Cone of Silence" is defined in the Code.

Bidders must file a copy of any written communication with the Clerk of the Board, which shall be available to any person upon request. Miami-Dade Public Library System (MDPLS) shall respond in writing and file a copy with the Clerk of the Board, which shall be made available to any person upon request. Written communications for questions, Request for Information (RFI) and addendums may also be in the form of e-mail addressed to Malka Rodriguez at CGA@MDPLS.ORG with copy to the Clerk of the Board at clerk.board@miamidade.gov.

ADDENDUM 10

Please be reminded that access to back of house and restricted areas are not allowed after the mandatory site visit held on 11-JUN-2025. Contractors can visit the Branch without impacting normal operations, requesting access to restricted areas, or damaging the building or any areas.

Q193. Detail 3 on drawing M4.0 shows several existing hydronic specialties: (1) CHW ET-1, (1) CHW Air Separator & (1) HW Air Separator. Please confirm whether these existing Hydronics Specialties are to remain in place or need to be replaced with new ones.

A193. All Hydronics Specialties marked as existing on Detail 3 are to remain. Hydronics Specialties shown on Schedules Sheet M5.0 shall be new, replacing the existing.

Q194. On Page E3.1 there is a symbol of a floor receptacle in the adult department and youth department, the symbol is square with another square like a trident beside the receptacle, What is this symbol? I recognize the data and the receptacle but that symbol I cannot recognize nor find on the symbol legend.

A194. Symbol represents a USB plug.

Q195. On page E3.1, are you planning to remove the entire floor slab inside or are you planning to cut the floor for the individual boxes? There is a total of 87 floor boxes. There are so many floor boxes that is probably more expensive to cut the floor and patch and you will end up with a swiss cheese of slab.

A195. This is means and methods of the contractor. Contractor must keep the same elevation throughout the entire building without impacting the design intent.

Q196. On page E3.2 it looks there is a telephone closet in the break room where the main telephone pier comes into and I guess all the existing telephones and cameras are going there. Now you have another IT room #16 beside children's department area. Are you going to do all the connections in one telephone room or are you going to split it into the two rooms? The same question applies to telephone and data.

A196. Smaller IT room is an IDF room. The main telephone board is in the break room.

Q197. On page E5.0 data phone riser diagram it shows all data and CCTV going into the new room but it shows on a ¾ conduit but on page E7.0 and E7.1 it shows data with ¾ conduit up to accessible ceiling with pullstrings that data will be run into telephone room with bare wire no piping. Please clarify which way you want it done.

A197. Refer to riser on E5.0 for Data/Tele/Security requirements.

Q198. Specifications:

a) There are no specifications for the ductwork & insulation
b) There are no specifications for the Chilled water & hot water piping & insulation
c) There are no specification for refrigerant piping & insulation
d) Please provide section 23 for HVAC specifications asap. We need this in order to complete estimate

A199:

a. Refer to Sheet M0.0
b. Chilled water: schedule 40 carbon steel Victaulic & fittings with 2" foam glass insulation.
Hot water: Copper with wrought copper solder joint fittings, 1- 1/2" fiberglass insulation for 1-1/2" to 4" pipe size and 2" for >4".
c. Drawn temper copper tube, ASTM B-88, TYPE L-ACR with wrought copper solder joint fittings with insulation Flexible Elastomeric: 1 inch thick ARMAFLEX.
d. This project does not has specifications. All information is on the drawings

Q200. Hot water pump:

e) M4.0 shows hot water pump on plans as existing per dotted lines. Does not show to replace.
f) M5.0 schedule shows HWP-1
g) M7.3 piping diagram does not indicate new Hot water pump.
h) Are we to replace this Hot water pump in chiller yard. Please clarify

A200. HWP-1 pump will be replaced with a new one. Provide a 50 GPM pump.

Q201. Temporary Cooling:

i) Will temporary cooling be required?

A201. Temporary cooling is not required by the Owner; however, contractor must schedule his work accordingly to ensure all finishes are preserved during construction.

Q202. RCP & air distribution schedule:

j) There are many drywall ceilings within the project. This is no mention of remote cable dampers for the air distribution in these area's.
k) Will remote cable dampers be required for balancing grills? The schedule only calls for OBD's in grills

A202:

a) Provide manual volume dampers at inaccessible gypsum board ceiling areas with Bowden Remote Cable Controllers by Young Regulator Company. Cable control to terminate at diffusers. Coordinate locations during the submittal process.
b) M3.0 shows the location of the volume dampers.

Q203. Piping diagram for AHU's

l) Please provide a piping detail & diagram for the AHU's for chilled water & hot water connection. This was not included in drawings
m) M7.2 AHU piping detail only shows Chilled water piping. No Hot water piping details
n) M7.2 detail shows both 2 way or 3 way control valves. Which one will be required?

A203:

- ***a) M7.3 shows "HEATED AND CHILLED WATER FLOW SCHEMATIC DIAGRAM"***
- ***b) Hot water piping connection to the AHU shall be completed in accordance with the contractor's means and methods.***
- ***c) Same as the existing AHU.***

Q204. Materials to be accepted by EOR answer yes or no:

o) Ductwork: sheet metal ductwork with R-6 wrap insulation?
p) Exhaust ductwork: bare sheet metal no insulation?
q) Fresh air ductwork: sheet metal with R-6 wrap insulation?
r) Refrigerant piping: ACR copper with ¾" insulation & zoom lock pro-press fittings?
s) UV paint added to exposed outdoor refrigerant piping?
t) Chiller water piping: schedule 40 carbon steel Victaulic & fittings with 2" foam glass insulation?
u) Exposed Outdoor CHW will have aluminum jacket added?
v) Hot water piping: copper piping with pro-press fittings and 1- 1/2" fiberglass insulation

A204:

- ***a) Refer to M0.0***
- ***b) Refer to M0.0***
- ***c) Refer to M0.0***
- ***d) Drawn temper copper tube, ASTM B-88, TYPE L-ACR with wrought copper solder joint fittings with insulation Flexible Elastomeric: 1 inch thick ARMAFLEX.***
- ***e) Yes***
- ***f) Yes***
- ***g) Yes***
- ***h) Copper with wrought copper solder joint fittings, 1- 1/2" fiberglass insulation for 1-1/2" to 4" pipe size and 2" for >4".***

Q205. Drawing sheet E1.0 reflects (4) S6 luminaire while E1.2 reflects (1) S6 luminaire. Please clarify which drawing will govern.

A205. Correct amount of wall mounted light fixtures is per E-1.0. E-1.2 is photometrics for parking & walkways.

Q206. Plumbing sheet P3.0 mentions to replace existing sink "SK" while P0.0 & PD3.0 mentioned to relocate existing sink. Please clarify.

A206:

- ***SK (BREAK ROOM 22) ELKAY LUSTERTONE, MODEL NO. LRAD2521 WITH HEAVY DUTY SOUND GUARD UNDERCOATING, 5 1/2 DEPTH, 3 HOLE 4" CENTERS***
- ***FAUCET: CHICAGO (*) MODEL NO. 786-206689AB, 8" GOOSENECK SPOUT WITH VANDAL RESISTANT LAMINAR FLOW NON-AERATING FLOW CONTROL 1.5 GPM CAST BRASS, CHROME PLATED, ADA COMPLAINT.***

- ***DRAIN: ELKAY (*) MODEL NO. LK35B, CHROME FINISH 3-1/2" INLET - 1-1/2" OUTLET BASKET STRAINER WITH MCGUIRE (*) MODEL NO. 8912, 1-1/2" TAILPIECE.***
- ***SINK SUPPLY: MCGUIRE (*) MODEL NO. H171LK, 1/2" ANGLE VALVE WITH LOOSE KEY HANDLE, CHROME FINISH.***

Q207. Please provide specifications for the new roof drains

A207. New Roof Drain Specifications: JR SMITH MODEL #1010-AD, GENERAL PURPOSE ROOF DRAIN WITH ALUMINUM DOME.

Revision to Q21: who is the current controls vendor?

A21: The contractor will hire SFC to integrate the mechanical equipment into the local BMS as well as the webserver. However, TRANE must provide the interface. Enclosed please find the existing Trane controls submittal.

ENCLOSURES :

1. LEED score cards
2. Interface Flooring 1
3. Interface Flooring 2
4. Existing Trane controls

REMINDER:

Solicitation remains under the Cone of Silence. Please request information via email to: Cga@mdpls.org and copy the Clerk of the Board at clerkbcc@miamidade.gov.

END OF ADDENDUM NO. 10

Cc: Clerk of the Board (clerkbcc@miamidade.gov)
Lisa Thompson
Erik Myers

LEED for New Construction

SOCOTEC
(561) 801-7576 www.socotec.us
110 E Broward Ave, Suite 950, Fort Lauderdale FL 33301

19119 Miami Lakes Library
6699 Windmill Gate Road, Miami Lakes, FL 33014

Certification Goal: Silver
Last update: 3/6/2024

LEED-BD+C Rating System: Version 4: Project Checklist **GBCI Final design review**

40	14	11	47	**Total Project Score**

Awarded points: 40; Pending: 0; Denied: 0

Certified 40 to 49 points **Silver 50 to 59 points** **Gold** 60 to 79 points **Platinum** 80 or more points

				Project Information (PI)	0	Requirements	Responsible	Action Needed	Resources	Due Date
Y		D	Credit 1	**Project Information**	0	Provide basic project site and building information; project's estimated occupancy; upload plans; and complete space usage calculator.	ALL	No further action required.	Space Usage Calculator	Awarded

5	0	0	10	Location & Transportation (LT)	16	Requirements	Responsible	Action Needed		Due Date / Status
Awar	Yes	?	No							
1				D Credit 2 **Sensitive Land Protection**	1	Locate the development footprint on land that has been previously developed.	ELM Arch	No further action required.		Awarded
1				D Credit 3 **High Priority Site**	2	Priority Designation: Locate the project on a site in a U.S. Department of Housing and Urban Development's Qualified Census Tract (QCT) or Difficult Development Area (DDA).	SOCOTEC	No further action required.		Awarded
2			3	D Credit 4 **Surrounding density and land uses**	5	**Option 2. Diverse uses** Construct or renovate a building or a space within a building such that the building's main entrance is within a ½-mile walking distance of the main entrance of four to seven (1 point) or eight or more (2 points) existing and publicly available diverse uses (listed in Appendix 1).	SOCOTEC	No further action required.		Awarded
1				D Credit 8 **Green Vehicles**	1	**Electric Vehicle Charging:** Install electrical vehicle supply equipment (EVSE) in 5% of all parking spaces used by the project. EVSE must provide a min. Level 2 charging capacity (208-240 volts); comply with regional/local standards for electric connectors; and be networked/internet addressable and capable of participating in demand-response program or time-of-use pricing to encourage off-peak charging.	ML Library / LJAAPA / ELM Arch	No further action required.		Awarded

7	2	0	1	Sustainable Sites (SS)	10	Requirements	Responsible	Action Needed		Due Date
Awar	Yes	?	No							
	Y			C Prereq 1 **Construction Activity Pollution Prevention**		Develop erosion & sedimentation control plan for construction activities. The plan must conform to erosion and sedimentation requirements of the 2012 US EPA Construction General Permit (CGP) or local equivalent, whichever is more stringent.	Alpha / GC	SWPPP plan with Erosion&Sedimentation control notes and details has been included in 50%CD (C4.00). No changes for 75% CD. To document with 100%CD. Design documentation completed. **Contractor to document implementation.**		Construction
1				D Credit 1 **Site Assessment**	1	Assess site conditions before design to evaluate sustainable options and inform related decisions about site design.	GSLA Design / Alpha / ELM Arch	GBCI comment: Provide revised documentation that includes information on human health effects. **Spinnaker provided additional information. No further action needed.**		Awarded
	2			C Credit 2 **Site Development**, Protect or Restore Habitat	2	Preserve and protect from all development and construction activity 40% of the greenfield area on the site. AND v4.1 upgrade: greenfield area 40% preserved + on-site restoration: 15% for 1 pt or 25% for 2 pts. + Plant a minimum of 6 species of vegetation that are native or adapted to the project's region AND have a 30 SF pollinator garden.	GSLA Design / GC	**GBCI comment:** The documentation indicates that the vegetation and/or soil restoration has not yet been completed. This credit should be resubmitted during the Construction phase if the required vegetation and soil restoration have not been completed at the time of the Design phase submission.		Construction
1				D Credit 3 **Open Space**	1	Provide outdoor space greater than or equal to 30% of the total site area (including building footprint). A minimum of 25% of that outdoor space must be vegetated (turf grass does not count as vegetation) or have overhead vegetated canopy.	ELM Arch / GSLA Design	No further action required. **Site area = 89,311 SF; open space excluding vehicular hardscape = 49,872 SF (55.8%)** **Landscape area excluding lawn = 24,187 SF (48.5% of open space).**		Awarded
3				D Credit 4 **Rainwater Management**	3	Option 1. In a manner best replicating natural site hydrology processes, manage on site the runoff from the developed site for: - 95% (2 pts) of regional or local rainfall events - 98% (3 pts) of regional or local rainfall events - Zero Lot Line Projects (3 points) local rainfall events using low-impact development (LID) and green infrastructure.	Alpha Corporation	No further action required.	Rainfall Events Calc.	Awarded

2				D	Credit 5	**Heat Island Reduction**	2	Non-Roof: Use paving materials (3-yr SR value 0.28/initial SR value of 0.33); vegetation that will shade paving areas within 10 years; an open grid pavement system (50% unbound); and/or provide shade with vegetated structures or energy generation systems. Roof: Use roofing materials: Low Sloped Roof ≤ 2:12 - Initial SRI 82 or 3-yr aged SRI 64 Steep Sloped Roof > 2:12 - Initial SRI 39 or 3-yr aged SRI 32	ELM Arch / GSLA Design	No further action required.		Awarded

6	0	0	6	Water Efficiency (WE)			11	Requirements	Responsible	Action Needed		Due Date
Awar	Yes	?	No									
Y				D	Prereq 1	**Outdoor Water Use Reduction**		Reduce the project's landscape water requirement by at least 30% from the calculated baseline for the site's peak watering month. Reductions must be achieved through plant species selection and irrigation system efficiency, as calculated by the Environmental Protection Agency (EPA) WaterSense Water Budget Tool.	GSLA Design	No further action required.		Awarded
Y				D	WEp2	**Indoor Water Use Reduction**		Use high-efficiency fixtures and fittings to reduce aggregate water consumption by 20% from the baseline. All newly installed toilets, urinals, private lavatory faucets, and showerheads that are eligible for labeling must be WaterSense labeled. Install appliances, equipment, and processes within the project scope that meet the requirements listed in the LEED Reference Guide. No once-through cooling with potable water for any equipment or appliances that reject heat.	LJAAPA / ELM Arch	No further action required.	Indoor Water Use Reduction Calc.	Awarded
Y				D	Prereq 3	**Building-level water metering**		Install permanent water meters that measure the total potable water use for the building and associated grounds. Meter data must be compiled into monthly and annual summaries; meter readings can be manual or automated. Commit to sharing with USGBC the resulting whole-project water usage data for a five-year period beginning on the date the project accepts LEED certification or typical occupancy, whichever comes first. This commitment must carry forward for five years or until the building changes ownership or lessee.	ML Library / SOCOTEC	No further action required.		Awarded
1			1	D	Credit 1	**Outdoor Water Use Reduction**	2	Reduce the project's landscape water requirement (LWR) by at least 50% from the calculated baseline for the site's peak watering month. Reductions must first be achieved through plant species selection and irrigation system efficiency as calculated in the Environmental Protection Agency (EPA) WaterSense Water Budget Tool.	GSLA Design	No further action required.		Awarded
4				D	WEc2	**Indoor Water Use Reduction**	6	Install appliances and process equipment within the project scope that meets the min. requirements listed in the LEED Reference Guide. And use high-efficiency fixtures, waterless urinals, and occupant sensors to reduce potable water use by 40%	LJAAPA	No further action required.		Awarded
1				D	Credit 4	**Water metering**	1	Install permanent water meters for two or more of the following water subsystems, as applicable to the project: **- Irrigation;** - Indoor plumbing fixtures and fittings. **- Domestic hot water;** - Boiler with aggregate projected annual water use of 100,000 gallons) or more, or boiler of more than 500,000 BtuH; - Reclaimed water;	LJAAPA / GSLA Design	No further action required.		Awarded

13	0	5	18	Energy and Atmosphere (EA)			37	Requirements	Responsible	Action Needed		Due Date
Awar	Yes	?	No									
	Y			C	Prereq 1	**Fundamental Commissioning & Verification**		Designate an independent CxA (before end of design development) to verify that all energy-related systems are installed, calibrated and perform according to the design. Develop OPR, BOD, Commissioning Plan and complete Commissioning Reports. Prepare and maintain a current facilities requirements and operations and maintenance plan that contains the information necessary to operate the building efficiently.	SOCOTEC	Review Owner's Project Requirements (OPR); Basis of Design (BOD); Construction Documents; and Envelope Design (if applicable). Provide documentation demonstrating the CxA's appropriate project experience for at least 2 similar projects of comparable size. Provide Commissioning Plan including at least one complete function performance test for each of the applicable systems indicated in the Cx systems scope; Current Facilities Requirements (CFR) and Operations and Maintenance (O&M) Plan; executive summary of the Cx Report that includes a list of systems commissioned, a summary of issues corrected, and list of major outstanding/unresolved issues.		Construction
Y				D	Prereq 2	**Minimum Energy Performance**		Demonstrate an improvement of 5% in the proposed building performance rating compared with the baseline building performance rating. Baseline is calculated according to ANSI/ASHRAE/IESNA Standard 90.1-2010, Appendix G, with errata, using a simulation model. Projects must meet the min. percentage savings before taking credit for renewable energy systems.	SOCOTEC	The total predicted annual energy consumption for the project is 151,939 kWh/year of electricity. 29.8% ASHRAE 90.1-2010 Appendix G energy cost savings.	Min. Energy Performance Calc.	Awarded
Y				D	Prereq 3	**Building-level energy metering**		Install new or use existing building-level energy meters, or submeters that can be aggregated to provide building-level data representing total building energy consumption (electricity, natural gas, chilled water, steam, fuel oil, propane, biomass, etc). Utility-owned meters capable of aggregating building-level resource use are acceptable. Commit to sharing with USGBC the resulting energy consumption data and electrical demand data (if metered) for a five-year period beginning on the date the project accepts LEED certification or typical occupancy, whichever comes first. At a minimum, energy consumption must be tracked at one-month intervals.	ML Library / SOCOTEC	No further action required.		Awarded
Y				D	Prereq 4	**Fundamental Refrigerant Management**		Do not use chlorofluorocarbon CFC- based refrigerants.	LJAAPA	No further action required.		Awarded
12			6	D	Credit 2	**Optimize Energy Performance**	14	**29%** Reduction in the building energy cost based on ASHRAE 90.1-2010. Use energy efficient lighting, high performance glazing, high efficiency HVAC systems, HVAC energy recovery units and high performance building envelope	SOCOTEC	No further action required.		Awarded
1				D	Credit 6	**Enhanced Refrigerant Management**	1	Select refrigerants that are used in heating, ventilating, air-conditioning, and refrigeration (HVAC&R) equipment to minimize or eliminate the emission of compounds that contribute to ozone depletion and climate change.	LJAAPA	No further action required.		Awarded
		5		C	Credit 7	**Green Power and Carbon Offsets**	2	Engage in a contract for qualified resources that have come online since January 1, 2005, for a minimum of five years, to be delivered at least annually. The contract must specify the provision of at least 50% or 100% of the project's energy from green power, carbon offsets, or renewable energy certificates (RECs). Green power and RECs must be Green-e Energy certified or the equivalent. RECs	MDC / SOCOTEC	Determine the percentage of green power or offsets based on the quantity of energy consumed, not cost. V4.1: 20% of 10 year energy consumption for 2 points. As per January 2023, costs are around $5/REC (1 RECs = 1 MWh). Prices fluctuate greatly.		Construction

3	5	2	4	Materials and Resources (MR)			13	Requirements	Responsible	Action Needed		Due Date
Awar	Yes	?	No									
Y				D	Prereq 1	**Storage & Collection of Recyclables**		Provide dedicated areas accessible to waste haulers and building occupants for the collection and storage of recyclable materials for the entire building. Collection and storage areas may be separate locations. Recyclable materials must include mixed paper, corrugated cardboard, glass, plastics, and metals. Take appropriate measures for the safe collection, storage, and disposal of two of the following: batteries, mercury-containing lamps, and electronic waste.	ELM Arch	No further action required.		Awarded

	Y			C	Prereq 2	**Construction and Demolition Waste Management Planning**		Develop and implement a construction and demolition waste management plan. Establish waste diversion goals for the project by identifying at least five materials (both structural and nonstructural) targeted for diversion and approximate a percentage of the overall project waste that these materials represent. Specify whether materials will be separated or commingled and describe the diversion strategies planned for the project. Describe where the materials will be taken and how the recycling facility will process the material. Alternative daily cover (ADC) does not qualify as material diverted from disposal. Land-clearing debris is not considered construction, demolition, or renovation waste that can contribute to waste diversion.	GC	Provide the construction and demolition waste management plan detailing all major waste streams generated, including disposal and diversion rates. Section 01 74 19 is inserted in LD sheets. (see below for the update to do on LD1.1)		Construction
3			2	C	Credit 1	**Building Life-Cycle Impact Reduction**	5	Demonstrate reduced environmental effects during initial project decision-making by reusing existing building resources or demonstrating a reduction in materials through life-cycle assessment.	ELM Arch.	No further action required.		Awarded
	1			C	Credit 2	**Building Product Disclosure and Optimization - Environmental Product Declarations Upgrade to v4.1**	2	**Environmental Product Declaration:** Use at least 20 different permanently installed products sourced from at least five different manufacturers that meet one of the following: Product-specific declarations or Environmental Product Declarations (EPD): Industry-wide (generic) EPD or Product-specific Type III EPD.	Specs: ELM. Constr.: GC	Complete the BPDO Calculator. For each product, provide EPD documentation and/or third party certified product documentation.		Construction
		1						**Multi-Attribute Optimization:** Use at least 5 products from at least 3 different manufacturers that have a compliant embodied carbon optimization report or action plan separate from the LCA or EPD.				
	1	1		C	Credit 3	**Building Product Disclosure and Optimization - Sourcing of Raw Materials Upgrade to v4.1**	2	**Leadership Extraction Practices:** Use products that meet at least one of the responsible extraction criteria below for at least 15% (1pt) or 30% (2 pts), by cost, of the total value of permanently installed building products in the project.	Specs: ELM. Constr.: GC	Complete the BPDO Calculator. For each product, provide manufacturer reports and/or leadership extraction criteria documentation.	BPDO Calculator	Construction
	1		1	C	Credit 4	**Building Product Disclosure and Optimization - Material Ingredients Upgrade to v4.1**	2	**Material Ingredient Reporting:** Use at least 20 different permanently installed products from at least five different manufacturers that use any of the following programs to demonstrate the chemical inventory of the product to at least 0.1% (1000 ppm).	Specs: ELM. Constr.: GC	Complete the BPDO Calculator. Provide documentation of chemical inventory for all products contributing toward credit compliance and/or products have optimized material ingredients criteria.		Construction
	2			C	Credit 5	**Construction and Demolition Waste Management**	2	Divert 50% and 3 material streams (1 point) **Divert 75% and 4 material streams (2 points)** Do not generate more than 2.5 pounds of construction waste per square foot of the building's floor area.	Specs: ELM. Constr.: GC	Complete the Construction and Demo Waste Calculator. Provide documentation verifying the diversion rate of commingled waste.	C&D Waste Calculator	Construction

3	4	2	5	Indoor Environmental Quality (IEQ)			16	Requirements	Responsible	Action Needed		Due Date
Awar	Yes	?	No									
Y				D	IEQp1	**Minimum IAQ Performance**		Meet the minimum requirements of ASHRAE Standard 62.1–2010, Sections 4–7, Ventilation for Acceptable Indoor Air Quality (with errata), or a local equivalent, whichever is more stringent and meet the requirements for both ventilation and monitoring of mechanically and naturally ventilated spaces.	LJAAPA	No further action required.	Minimum IAQ Performance Calc.	Awarded
Y				D	Prereq 2	**Environmental Tobacco Smoke Control**		Prohibit smoking inside the building. Prohibit smoking outside the building except in designated smoking areas located at least 25 feet from all entries, outdoor air intakes, and operable windows. Also prohibit smoking outside the property line in spaces used for business purposes.	ML LIbrary / ELM Arch	No further action required.		Awarded
1			1	D	Credit 1	**Enhanced IAQ Strategies**	2	Comply with the following requirements, as applicable: - Install permanent entryway systems at least 10 feet long in the primary direction of travel to capture dirt and particulates entering the building at regularly used exterior entrances. - Exhaust hazardous gases/chemicals: provide self closing doors & deck-to-deck partitions or a hard-lid ceiling. -Each ventilation system that supplies outdoor air to occupied spaces must have > MERV 13 filtration media.	ELM Arch / LJAAPA	GBCI comments: 1) From the floor plan provided, it does not appear that the installed entryway systems comply with the requirements of this credit. The project must install permanent entryway systems at least 10 feet long in the primary direction of travel to capture dirt and particulates entering the building at regularly used exterior entrances. **02/16/2024: not pursuing, will pursue if the point is needed. One point is being attempted with option 2.**		Awarded

	3			C	Credit 2	**Low-Emitting Materials Upgrade to v4.1**	3	Meet the requirements for volatile organic compound (VOC) emissions into indoor air and the VOC content of materials, as well as the testing methods by which indoor VOC emissions are determined. Different materials must meet different requirements to be considered compliant for this credit. The building interior and exterior are organized in different categories, each with different thresholds of compliance. - Interior Paints and Coatings applied on site - Interior Adhesives and Sealants applied on site - Flooring - Ceilings - Insulation - Wall systems (include doors and windows) - Composite Wood	ELM Arch / GC	Complete the Low Emitting Materials Calculator and provide documentation demonstrating that the sustainable criteria are met. **Included in Specifications.**	Low Emitting Materials Calculator	Construction
	1			C	Credit 3	**Construction IAQ Management Plan**	1	Develop and implement an indoor air quality (IAQ) management plan for the construction and preoccupancy phases of the building. The IAQ Management Plan must include SMACNA IAQ Guidelines for Occupied Buildings Under Construction, 2nd Ed. (2007) IAQ management practices and a no-smoking plan that prohibits that use of tobacco products inside the building and within 25 feet of the building entrance(s) during construction.	SOCOTEC	Provide the IAQ management plan and photographs/narrative documenting each of the IAQ measures implemented; annotate photographs to indicate IAQ measure depicted and the general location of the photograph. Additionally, provide photographs/narrative documenting the methods employed to protect absorptive materials from moisture damage. Highlight materials stored or installed on-site. **Included in Specifications.**		Construction
		2		C	Credit 4	**Indoor Air Quality Assessment**	2	After construction ends and before occupancy, but under ventilation conditions typical for occupancy, conduct baseline IAQ testing. Use current versions of ASTM standard methods, EPA compendium methods, or ISO methods, as indicated. Laboratories that conduct the tests for chemical analysis of formaldehyde and volatile organic compounds must be accredited under ISO/IEC 17025 for the test methods they use.	GC - 3rd Party for testing	Describe test date(s), testing protocols, and scope; sampling locations with respect to floor area, size, and ventilation system; any corrective measures implemented or project-specific special considerations. Provide air testing reports. **Included in specification.**		Construction
2				D	Credit 6	**Interior Lighting Upgrade to v4.1**	2	Meet 1 strategy for 1 point. Meet 3 strategies for 2 points. **1. Glare Control** For all regularly occupied spaces, meet one of the following requirements: Use light fixtures with a luminance of less than 7,000 candela per square meter (cd/m)2 between 45 and 90 degrees from nadir. OR Achieve a Unified Glare Rating (UGR) rating of <19 using software modelling calculations of the designed lighting. **2. Color Rendering** For all regularly occupied spaces meet one of the following requirements: Use light sources that have a Color Rendering Index (CRI) of at least 90. OR Use light sources that have a Color Fidelity Index greater than or equal to 78 and a gamut index between 97 and 110, determined in accordance with Illuminating Engineering	LJAAPA / EML	(requirement cont.) **3. Lighting Control** Provide dimmable or multilevel lighting for 90% of occupant spaces. **4. Surface Reflectivity** For at least 90% regularly occupied spaces, use interior finishes with a surface reflectance greater or equal to 80% for ceilings and 55% for walls. If included in the project scope, use furniture finishes with a surface reflectance greater or equal to 45% for work surfaces and 50% for movable partitions. No further action required.	Interior Lighting Calculator	Awarded

2	2	2	0	Innovation in Design (ID)			6	Requirements	Responsible	Action Needed		Due Date
Awar	Yes	?	No									
1				D/C	Credit 1.1	**Innovation in Design**: O+M starter kit	1	Achieve significant, measurable environmental performance using a strategy not addressed in the LEED green building rating system.	ML Library	No further action required.		Awarded
		1		D/C	Credit 1.2	**Pilot Credit:**	1	Achieve one pilot credit from USGBC's LEED Pilot Credit Library	SOCOTEC	Integrative Analysis of building materials		Construction
1				D/C	Credit 1.3	**Innovation or Pilot:** Lamp Purchase	1	See Innovation in Design or Pilot Requirements.	ML Library	No further action required.		Awarded
		1		D/C	Credit 1.4	**Exemplary Performance**	1	Achieve exemplary performance in an existing LEED v4 prerequisite or credit that allows exemplary performance, as specified in the LEED Reference Guide, v4 edition. An exemplary performance point is typically earned for achieving double the credit requirements or the next incremental percentage threshold.	GC	Low-emitting materials.		Construction
	1			D/C	Credit 1.5	**Exemplary Performance** or Pilot credit	1	See Exemplary Performance Requirements.	GC	EPDs x 40 or Pilot credit: Assessment for Resilience.		Construction
	1			C	Credit 2	**LEED™ Accredited Professional**	1	At least one principal participant of the project team must be a LEED Accredited Professional (AP) with a specialty appropriate for the project.	SOCOTEC	No further action required.		Construction

1	1	0	2	Regional Priority (RP)			4	Requirements	Responsible	Action Needed		Due Date
Awar	Yes	?	No									
			1	D/C	Credit 1.1	**Regional Priority:**	1	Earn up to four of the six Regional Priority credits. These credits have been identified by the USGBC as having additional regional importance for the project's region. A database of Regional Priority credits and their geographic applicability is available on the USGBC website, www.usgbc.org/rpc. One point is awarded for each Regional Priority credit achieved, up to a maximum	SOCOTEC	EAc4 Renewable Energy production (with Green power, for 6 points v4.1)		100% CD
	1			D/C	Credit 1.2	**Regional Priority:**	1		SOCOTEC	Site development 2 pts.		100% CD
			1	D/C	Credit 1.3	**Regional Priority:**	1		SOCOTEC	SSc6 Light Pollution Reduction		100% CD
1				D/C	Credit 1.4	**Regional Priority:**	1		SOCOTEC	Optimize Energy Performance 8 points		Awarded

Miami Lakes - Library Expansion - Miami, FL

Rendered Plan 1

06.13.25

Interface®

Aerial Collection - AE310
104625 Greige
50 x 50 cm
Installed Monolithic

Aerial Collection - AE315
105817 Mist/Aquamarine
25 x 100 cm
Installed 25 cm x 1 m Quarter Turn; Ashlar

Aerial Collection - AE317
105830 Aquamarine
25 x 100 cm
Installed 25 cm x 1 m Quarter Turn; Ashlar

Night Lights Collection - Aglow
107254 Nickel Gold
25 x 100 cm
Installed Ashlar

Night Lights Collection - Aglow
107255 Nickel Ivy
25 x 100 cm
Installed Ashlar

Night Lights Collection - Aglow
107256 Titanium Lagoon
25 x 100 cm
Installed Ashlar

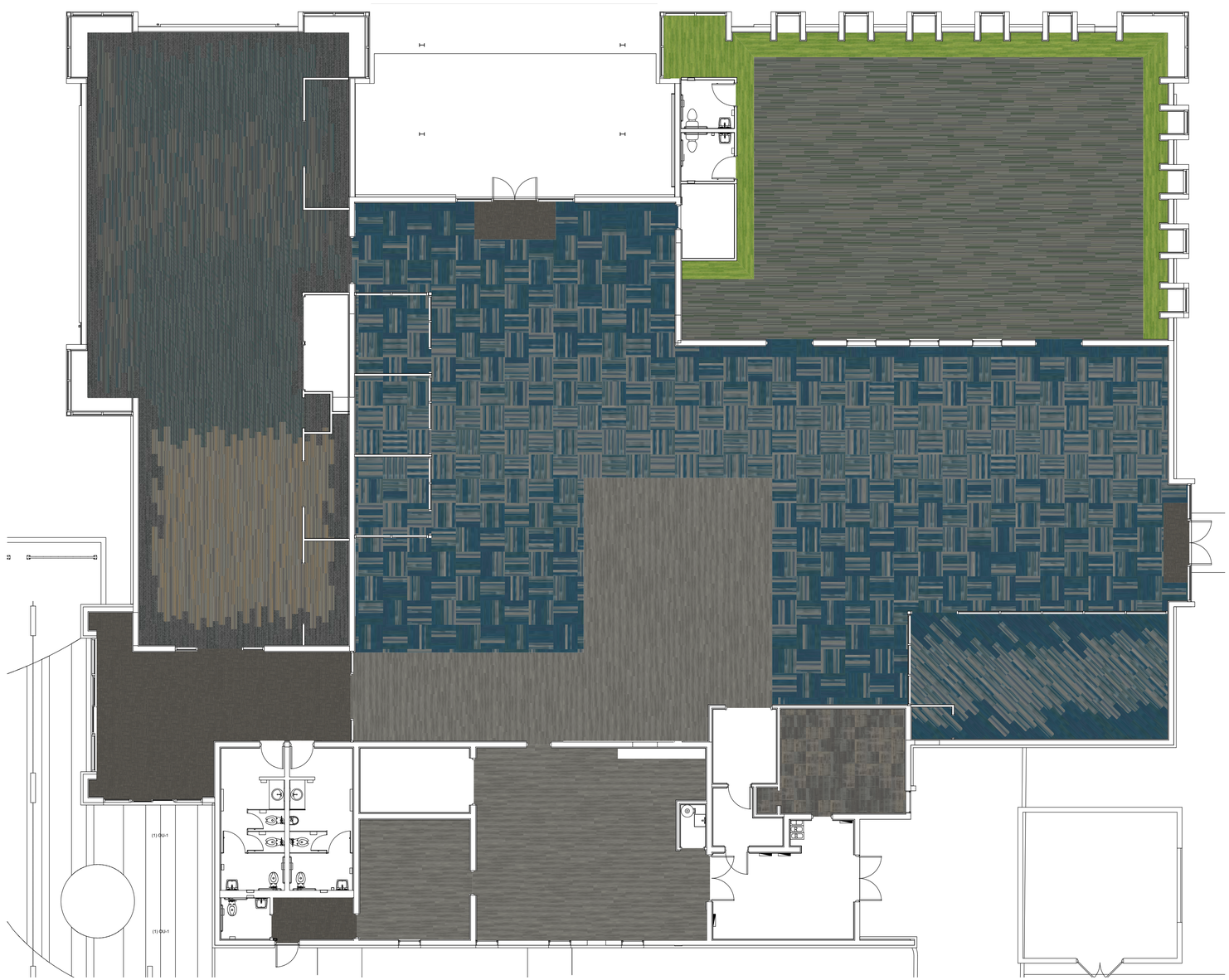
Night Lights Collection - Glisten
107231 Iron
25 x 100 cm
Installed Ashlar

Night Lights Collection - Luminescent
107244 Titanium Lagoon
25 x 100 cm
Installed Ashlar

Step Repeat Collection - SR899
104938 Smoke
50 x 50 cm
Installed Monolithic

Studio Set
A00702 Pewter
25 x 100 cm
Installed Ashlar

Studio Set
A00715 Chartreuse
25 x 100 cm
Installed Ashlar



DESIGN STUDIO

Scale: 1/8" = 1' 0"
Paper Size: ARCH D
Case: 00161499

PROJECTED GROSS EMBODIED CARBON (cradle-to-gate):
Interface 7278 kg. CO_2e
Industry Average 12217 kg. CO_2e
Learn more about these values at www.interface.com/carbonmetrics

Miami Lakes - Library Expansion - Miami, FL

Finish Plan 1

06.13.25

Interface®

Aerial Collection - AE310
104625 Greige
50 x 50 cm
Installed Monolithic

Aerial Collection - AE315
105817 Mist/Aquamarine
25 x 100 cm
Installed 25 cm x 1 m Quarter Turn; Ashlar

Aerial Collection - AE317
105830 Aquamarine
25 x 100 cm
Installed 25 cm x 1 m Quarter Turn; Ashlar

Night Lights Collection - Aglow
107254 Nickel Gold
25 x 100 cm
Installed Ashlar

Night Lights Collection - Aglow
107255 Nickel Ivy
25 x 100 cm
Installed Ashlar

Night Lights Collection - Aglow
107256 Titanium Lagoon
25 x 100 cm
Installed Ashlar

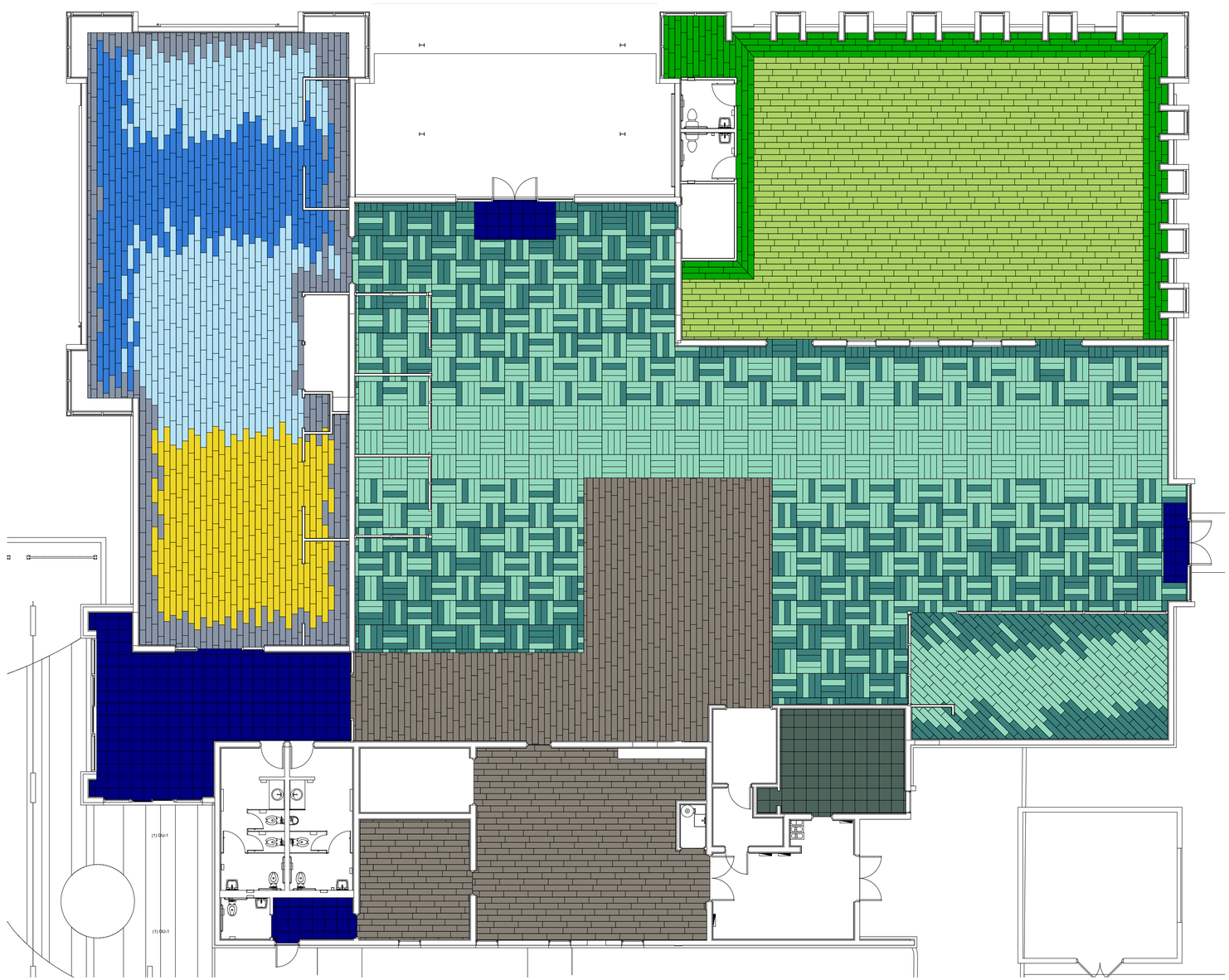
Night Lights Collection - Glisten
107231 Iron
25 x 100 cm
Installed Ashlar

Night Lights Collection - Luminescent
107244 Titanium Lagoon
25 x 100 cm
Installed Ashlar

Step Repeat Collection - SR899
104938 Smoke
50 x 50 cm
Installed Monolithic

Studio Set
A00702 Pewter
25 x 100 cm
Installed Ashlar

Studio Set
A00715 Chartreuse
25 x 100 cm
Installed Ashlar



DESIGN STUDIO

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Case: 00161499

PROJECTED GROSS EMBODIED CARBON (cradle-to-gate):
Interface 7314 kg. CO_2e
Industry Average 12268 kg. CO_2e
Learn more about these values at www.interface.com/carbonmetrics

Resubmittal

SOUTH COOL CORP

Date: 02/04/2019
Project Name: Miami Lakes Branch Library
Project Location: 6699 Windmill Gate Rd, MIAMI LAKES, FL 33014

Prepared For:

SOUTH COOL CORP
3422 SW 156 CT
MIAMI FL 33185 USA

Customer PO Number: 2321351
Customer Project Number:
Sold To: SOUTH COOL CORP

Trane Sales Office:

Miramar
2884 Corporate Way
MIRAMAR, FL 33025

Phone: 954-499-6900
Fax:
Web: http://www.trane.com

Mechanical Engineer:

Architect:

Trane Contracting Team:

Account Manager: Renny Urdanetta

Project Manager: Winston Zhang
Chuncheng.Zhang@trane.com

Design By: Jeff Ostrow
Jeff.Ostrow@Trane.com

Submittal Contents

The following is a list of documents included in this submittal in the order that they appear.

Miami Lakes Branch Library
6699 Windmill Gate Rd
MIAMI LAKES, FL 33014

Customer Contact

SOUTH COOL CORP
3422 SW 156 CT
MIAMI FL 33185 USA

TRANE PROJECT TEAM

SALESPERSON:	**PROJECT MANAGER:**	**DESIGNED BY:**
Renny Urdanetta	Winston Zhang	Jeff Ostrow

TITLE PAGE

CID: 00058359	NUM.	REVISION	DATE:	BY:
PID: 00062912	6	Revision 6	2/4/2019	JPO
PROJECT: H434351	5	Revision 5	5/14/2018	JPO
SALESPERSON: R Urdanetta	4	Revision 4	4/30/2018	JPO
DESIGNED BY: J Ostrow	3	Revision 3	4/18/2018	JPO
CHECKED BY:	2	Revision 2	3/23/2018	JPO

Miramar 2884 Corporate Way MIRAMAR, FL 33025 954-499-6900	PROJECT: Miami Lakes Branch Library 6699 Windmill Gate Rd MIAMI LAKES FL 33014

FILE: Miami Lakes Branch Library REV6.vsdx — DWG 1 OF 31

INDEX OF CONTROL SYSTEM DRAWINGS				
DWG #	DRAWING TITLE	REVISION LEVEL	REVISION DATE	COMMENTS
1	TITLE PAGE	6	2/4/2019	
2	DRAWING INDEX	-	3/1/2018	
3	LEGEND	-	3/1/2018	
4	WIRING NOTES	-	3/1/2018	
5	Riser	5	5/14/2018	
6	SUBMITTAL NOTES	5	5/14/2018	
7	SC - 1 SC - 1 CONTROLLER	-	3/1/2018	
8	CH-1, AHU-1, AHU-2 & AHU-3 SEQUENCE OF OPERATION	6	2/4/2019	
9	CHILLER PLANT UC600 - 1 FLOW	2	3/23/2018	
10	CHILLER PLANT UC600 - 1 CONTROLLER	-	3/1/2018	
11	CHILLER PLANT CHR - 2 CONTROLLER	-	3/1/2018	
12	AHU-1 UCCA - 1 FLOW	3	4/18/2018	
13	AHU-1 UCCA - 1 CONTROLLER	-	3/1/2018	
14	AHU-1 XM70 - 1 CONTROLLER	-	3/1/2018	
15	AHU-1 XM30 - 1 CONTROLLER			
16	AHU-2 UCCA - 2 FLOW	3	4/18/2018	
17	AHU-2 UCCA - 2 CONTROLLER	-	3/1/2018	
18	AHU-2 XM70 - 2 CONTROLLER	-	3/1/2018	
19	AHU- 2 XM30 - 2 CONTROLLER			
20	AHU-3 UCCA - 3 FLOW	3	4/18/2018	
21	AHU-3 UCCA - 3 CONTROLLER	-	3/1/2018	
22	AHU-3 XM70 - 3 CONTROLLER	-	3/1/2018	
23	AHU- 3 XM30 - 3 CONTROLLER			
24	INTERCONNECT WIRING DETAIL			
25	INTERCONNECT WIRING DETAIL 2			
26	DETAIL SHEET	-	3/1/2018	
27	DETAIL SHEET 2	-	3/1/2018	
28	DETAIL SHEET 3			
29	ADDRESS SCHEDULE	-	3/1/2018	
30	ENCLOSURE SCHEDULE	-	3/1/2018	
31	BILL OF MATERIALS	-	3/1/2018	

DRAWING INDEX

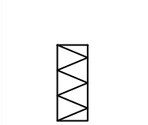
CID: 00058359	NUM.	REVISION	DATE:	BY:
PID: 00062912				
PROJECT: H434351				
SALESPERSON: R Urdanetta				
DESIGNED BY: J Ostrow				
CHECKED BY:	-	Original Submittal	3/1/2018	JPO

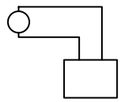
TRANE

Miramar 2884 Corporate Way MIRAMAR, FL 33025 954-499-6900	PROJECT: Miami Lakes Branch Library 6699 Windmill Gate Rd MIAMI LAKES FL 33014

FILE: Miami Lakes Branch Library REV6.vsdx

TYPICAL FLOW SHAPE SYMBOLS


AIR FILTER

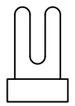

FAN CFM SENSOR


FIX PLATE HEAT-X

COIL


DUCT DIVIDER


FUEL FIRED HEAT-X


ELECTRIC HEATER


ALARM


CURRENT SENSOR

POWER METER


ACTUATOR


DAMPER


ROUND DAMPER


TRAQ DAMPER


OUTDOOR UNIT


OUTDOOR UNIT


FAN


PLENUM FAN

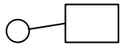
PLENUM FAN ARRAY


PROPELLOR FAN


EXHAUST FAN


SUPPLY FAN


LIQUID FLOW SENSOR

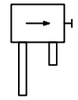

FLOAT SWITCH


FLOW SWITCH


ULTRASONIC SENSOR


OVERFLOW ALARM

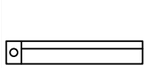

INDOOR AIR QUALITY


SMOKE DETECTOR


HUMIDISTAT


HUMIDITY SENSOR


TEMP/HUMID SENSOR


WALL HEATER


OCCUPANCY SENSOR

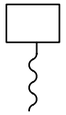

VARIABLE FREQ DRIVE


MOTOR STARTER


DISCONNECT


SENSOR MTG CLIP

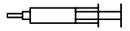

SPACE TEMP SENSOR


AVERAGING
TEMPERATURE SENSOR


TEMPERATURE SENSOR


FROSTSTAT


THERMOWELL

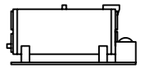

THERMAL PASTE


WALL THERMOSTAT

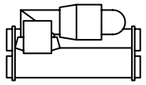

SEQUENCER


DC POWER SUPPLY


TRANSFORMER


INDUSTRIAL BOILER


BOILER

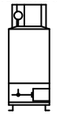

CENTRAVAC


INTELLIPAK CHILLER


COAXIAL COIL

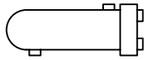

REVERSING VALVE

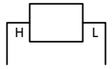

COOLING TOWER


GLYCOL MAKEUP


ICE STORAGE


HEAT EXCHANGER


HW CONVERTER



DIFFERENTIAL
PRESSURE

DUCT STATIC

STATIC TIP


DUCT PRESS PORTAL


FLUID PRESS SENSOR


ID PRESS PORTAL


OD PRESS PORTAL

PRESSURE GAUGE

PRESS TRANSDUCER

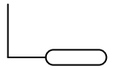

SYPHON LOOP

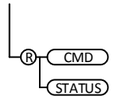

INLINE PUMP


PUMP

CABLE RELAY

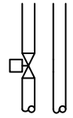

CABLE RELAY


UNIVERSAL POINT



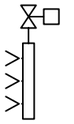
CURRENT SENS W/CMD

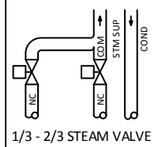
WALL SWITCH


COIL VALVE


BALL / GLOBE VALVE


BUTTERFLY VALVE


DUCT HUMIDIFIER



1/3 - 2/3 STEAM VALVE

LEGEND				
CID: 00058359	NUM.	REVISION	DATE:	BY:
PID: 00062912				
PROJECT: H434351				
SALESPERSON: R Urdanetta				
DESIGNED BY: J Ostrow				
CHECKED BY:	-	Original Submittal	3/1/2018	JPO
Miramar 2884 Corporate Way MIRAMAR, FL 33025 954-499-6900	PROJECT: Miami Lakes Branch Library 6699 Windmill Gate Rd MIAMI LAKES FL 33014			
FILE: Miami Lakes Branch Library REV6.vsdx			DWG 3 OF 31	

WIRING NOTES

ELECTRICAL CONTRACTOR FOR TRANE:

1. REFER TO DEVICE INSTALLATION MANUALS FOR SPECIFIC WIRING REQUIREMENTS.
2. FIELD WIRING MUST BE IN ACCORDANCE WITH NATIONAL ELECTRICAL CODE, STATE AND LOCAL BUILDING CODES, AND APPLICABLE SECTIONS OF PROJECT SPECIFICATION.
3. TAG ALL CONTROL WIRING AT EACH END OF THE CABLE OR WIRE PER TAGS SHOWN IN ATTACHED DRAWINGS.
4. AVOID OVER TIGHTENING CABLE TIES AND OTHER FORMS OF CABLE WRAPS. THIS CAN DAMAGE THE WIRES INSIDE THE CABLES.
5. DO NOT CABLE TIE TO INSULATED WATER, STEAM OR OTHER LINES.
6. IN OPEN PLENUMS, DO NOT RUN NEAR LIGHTING BALLASTS.
7. ALL PANELS AND FIELD DEVICES LISTED IN THIS DOCUMENT ARE TO BE INSTALLED BY CONTROL ELECTRICAL SUBCONTRACTOR UNLESS OTHERWISE NOTED ON DRAWINGS.
8. MOUNT ALL ROOM SENSORS AND SWITCHES AS SHOWN ON THE CONSTRUCTION DOCUMENTS, UNLESS OTHERWISE DIRECTED IN WRITING BY THE OWNER AND/ OR ENGINEER.
9. FLEXIBLE CONDUIT IS NOT TO EXCEED 24" IN LENGTH.
10. CONTROL PANELS ARE NOT TO BE USED AS JUNCTION BOXES OR RACEWAYS. WIRING THAT DOES NOT TERMINATE IN A CONTROL PANEL IS NOT TO BE RUN WITHIN THE PANEL.
11. BINARY INPUT LIMITS: 1000 FT (300 M).
12. 0~10 VDC ANALOG INPUT LIMITS: 300 FT (100 M).
13. 0~20 MA ANALOG INPUT LIMITS: 1000 FT (300 M).
14. VARIABLE RESISTANCE ANALOG INPUT LIMITS: 300 FT (100 M).
15. ANALOG OUTPUT LIMITS: 1000 FT (300 M).
16. BINARY OUTPUT LIMITS: 1000 FT (300 M).
17. WIRING POWER FROM THE AC OUT TERMINALS TO POWER ANALOG INPUT DEVICES WILL CAUSE IMMEDIATE CONTROLLER FAILURE IF INPUT DEVICE USES HALF-WAVE RECTIFICATION. WHEN UNSURE, USE A SEPARATE SUPPLY FOR DEVICE.

GENERAL COMMUNICATION GUIDE:

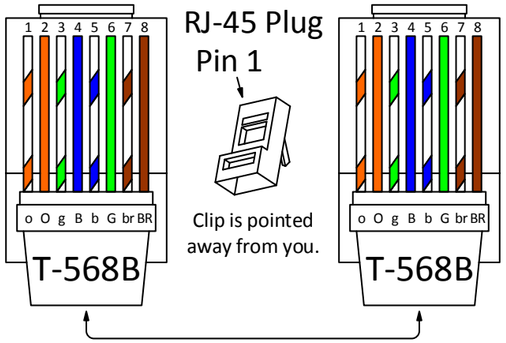
18. DO NOT RUN COMMUNICATION LINK WIRING IN THE SAME CONDUIT OR WIRE BUNDLE WITH AC-POWER WIRES (INCLUDING CONDUCTORS RUNNING FROM TRIAC-TYPE OUTPUTS). KEEP POLARITY CONSISTENT THROUGHOUT THE SITE. MAKE SURE THAT THE 24 VAC POWER SUPPLIES ARE CONSISTENT IN HOW THEY ARE GROUNDED.
    AVOID SHARING 24 VAC BETWEEN CONTROLLERS. USE ONLY ONE TYPE OF COMMUNICATION CABLE; DO NOT MIX CABLE. IF AN EXISTING JOB USED ALTERNATE CABLE, CONTINUE USING THE SAME CABLE AFTER APPROVAL FROM THE PROJECT MANAGER.
19. BACNET MS/TP COMMUNICATION CABLE MUST BE SHIELDED TWISTED PAIR, 18 AWG MINIMUM, STRANDED, TINNED COPPER CONDUCTORS. SHIELD MUST BE CONTINUOUS THROUGHOUT, ISOLATED FROM OTHER CONDUCTORS OR GROUND, AND GROUNDED AT THE SYSTEM CONTROLLER ONLY. MAXIMUM CAPACITANCE BETWEEN CONDUCTORS IS 24 PICOFARADS PER FOOT. MAXIMUM DISTANCE IS 4000 FT (1372 M).
    MAXIMUM OF 60 TRANE DEVICES PER LINK BUT LESS WHEN COMBINED WITH NON-TRANE DEVICES. A TRACER BACNET TERMINATOR IS REQUIRED AT EACH END OF THE COMMUNICATION LINK. EACH TERMINATOR REQUIRES 24 VDC POWER. EXPANSION MODULE LINK LIMIT IS 656 FT (200 M). TOPOLOGY MUST BE DAISY CHAINED.
20. LONTALK (COMM 5) COMMUNICATION CABLE MUST BE LEVEL 4 UNSHIELDED, 22 AWG WITH MAXIMUM CAPACITANCE BETWEEN CONDUCTORS OF 17 PICOFARADS PER FOOT. MAXIMUM DISTANCE IS 4500 FT (1400 M). MAXIMUM DEVICES IS 60 DEVICES WITHOUT REPEATER AND 120 WITH REPEATER. ONE REPEATER PER LINK CAN BE USED FOR AN ADDITIONAL 4500 FT (1400 M), 60 DEVICES.
    CCP III LINK LIMIT IS 3500 FT (1090 M). 105 OHMS, 1%, 1/4 WATT TERMINATION RESISTORS ARE REQUIRED AT EACH END FOR LEVEL 4 WIRE AND 82 OHMS, 1%, 1/ 4 WATT AT EACH END FOR 18 AWG SHIELDED (PURPLE) WIRE. EX2 LINK LIMIT IS 1000 FT (300 M). TOPOLOGY MUST BE DAISY CHAINED.
21. COMM 3 AND COMM 4 COMMUNICATION CABLE MUST BE SHIELDED TWISTED PAIR, 18 AWG MINIMUM, STRANDED, TINNED COPPER CONDUCTORS. SHIELD MUST BE CONTINUOUS THROUGHOUT, ISOLATED FROM OTHER CONDUCTORS OR GROUND, AND GROUNDED AT BCU ONLY.
    MAXIMUM CAPACITANCE BETWEEN CONDUCTORS IS 24 PICOFARADS PER FOOT. MAXIMUM DISTANCE IS 5000 FT (1715 M). UNDER CERTAIN CONDITIONS, TERMINATION RESISTORS ARE REQUIRED ON A COMM 3 COMMUNICATION LINK.
22. ETHERNET LAN COMMUNICATION CABLE MAXIMUM DISTANCE IS 295 FT (90 M) PLUS 33 FT (10 M) FOR PATCH CABLES.

24. MOUNT ALL ROOM SENSORS AND SWITCHES 4FT (1.2M) ABOVE FINISHED FLOOR.

MECHANICAL CONTRACTOR:

1. DAMPERS ARE TO BE INSTALLED BY SHEET METAL CONTRACTOR UNLESS OTHERWISE NOTED.
2. CONTROL VALVES AND ACCESSORIES INSTALLED DIRECTLY INTO PIPING(SENSOR WELLS, THREADOLETS, ETC.) ARE TO BE INSTALLED BY MECHANICAL CONTRACTOR.
3. FLOW DIAGRAMS SHALL NOT BE A GUIDE FOR PIPE AND VALVE INSTALLATION REFER TO THE VALVE MANUFACTURER'S INSTALLATION INSTRUCTIONS FOR INSTALLATION GUIDANCE.

ETHERNET CAT6 T-568B WIRING DETAIL



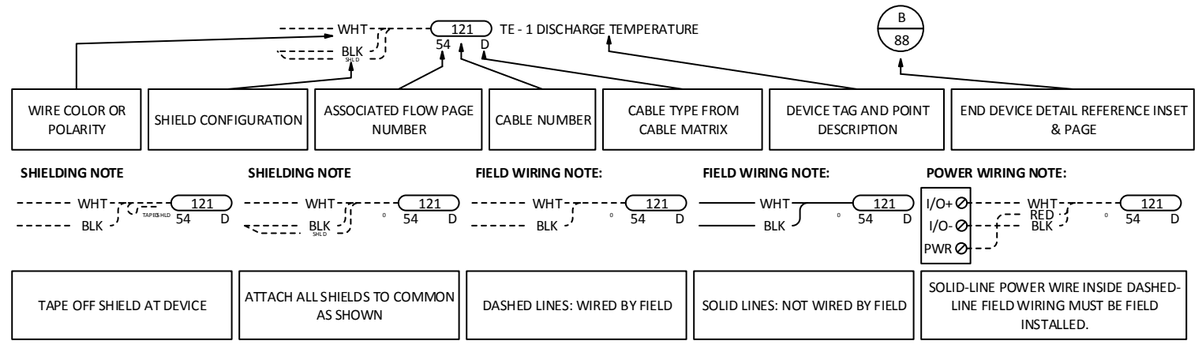
CABLE MATRIX

KEY	PART NO*	DESCRIPTION	WIRE COLORS
A	052003-S	18/2 TWIST SHLD VIOLET PLENUM CABLE	WHT, BLK
B	N/A	FACTORY PROVIDED CABLE	
C	105500-S	22/2 TWIST NON-SHLD BLUE COMM PLENUM CABLE	WHT, BLU/BLU
D	002320-S	18/2 TWIST SHLD WHITE PLENUM CABLE	WHT, BLK
E	002330-S	18/3 TWIST SHLD WHITE PLENUM CABLE	WHT, BLK, RED
F	002340-S	18/4 TWIST SHLD WHITE PLENUM CABLE	WHT, BLK, RED, GRN
G	002351	18/6 TWIST SHLD WHITE PLENUM CABLE	WHT, BLK, RED, GRN, BLU, BRN
J	N/A	1 PAIR #14 THHN STRANDED IN CONDUIT	
L	N/A	ETHERNET RG58 THNNET PLENUM CABLE	
M	555619-S	ETHERNET CAT-5 PLENUM CABLE	
O	002352-S	18/8 TWIST SHLD WHITE PLENUM CABLE	WHT, BLK, RED, GRN, BLU, YEL, ORN, BRN
P	106502-S	22/2 TWIST SHLD ORANGE COMM PLENUM CABLE	BLK, RED
Q	761360-S	16/2 SOLID RED SMOKE DETECTOR PLENUM CABLE	WHT, RED
2C	N/A	18/2 SOLID THERMOSTAT PLENUM CABLE	WHT, RED
3C	N/A	18/3 SOLID THERMOSTAT PLENUM CABLE	WHT, RED, GRN
5C	510005-S	18/5 SOLID THERMOSTAT PLENUM CABLE	WHT, RED, GRN, YEL, BLU
8C	510007-S	18/8 SOLID THERMOSTAT PLENUM CABLE	WHT, RED, GRN, YEL, BLU, ORN, BLK, BRN
10C	N/A	18/10 SOLID THERMOSTAT PLENUM CABLE	WHT, RED, GRN, YEL, BLU, ORN, BLK, BRN, PNK, GRY
12C	N/A	18/12 SOLID THERMOSTAT PLENUM CABLE	WHT, RED, GRN, YEL, BLU, ORN, BLK, BRN, PNK, GRY, PUR, TAN

* TRANE APPROVED WINDY CITY PART NUMBERS. WHEN ORDERING CABLE SPECIFY JACKET COLOR. PART NUMBERS ARE SUBJECT TO CHANGE WITHOUT NOTICE.

CABLE MATRIX NOTES
ALL CABLE WIRING METHODS MUST BE TRANE RECOMMENDED. CONTACT TRANE FOR RECOMMENDED CABLES AND SPECIFICATIONS

CABLE INFORMATION SHAPE (CIS)
EACH CABLE CONNECTION HAS A CIS WHICH PROVIDES SOME OR ALL OF THE INFORMATION INDICATED BELOW



SHIELDING NOTE
WHT / BLK — 121 — 54 D — TAPE SHLD

SHIELDING NOTE
WHT / BLK — 121 — 54 D — BLK SHLD

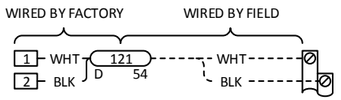
FIELD WIRING NOTE:
WHT / BLK — 121 — 54 D

FIELD WIRING NOTE:
WHT / BLK — 121 — 54 D

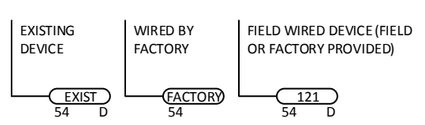
POWER WIRING NOTE:
I/O+ / I/O- / PWR — WHT / RED / BLK — 121 — 54 D

TAPE OFF SHIELD AT DEVICE	ATTACH ALL SHIELDS TO COMMON AS SHOWN	DASHED LINES: WIRED BY FIELD	SOLID LINES: NOT WIRED BY FIELD	SOLID-LINE POWER WIRE INSIDE DASHED-LINE FIELD WIRING MUST BE FIELD INSTALLED.

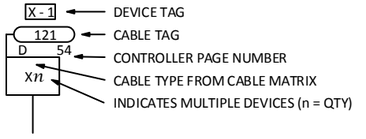
FACTORY MOUNTED DEVICE WITH FIELD MOUNTED CONTROLLER:



FIELD, FACTORY AND EXISTING DEVICE NOTES:

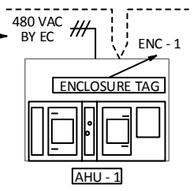


FLOW SHAPE NOTES:

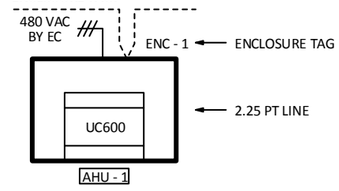


RISER 'WIRING BY' NOTE:

EC - ELECTRICAL CONTRACTOR
ESC - ELECTRICAL SUBCONTRACTOR
OTHER
TRANE
EXIST - EXISTING



ENCLOSURE TAG:



INTERCONNECT WIRING DETAIL REFERENCE:

A / 12 — INTERCONNECT WIRING DETAIL REFERENCE INSET LETTER (TOP), PAGE NUMBER (BOTTOM)

RISER TERMINATION DEVICES

BT — BACNET TERMINATOR

R — TERMINATION RESISTOR

WIRING NOTES

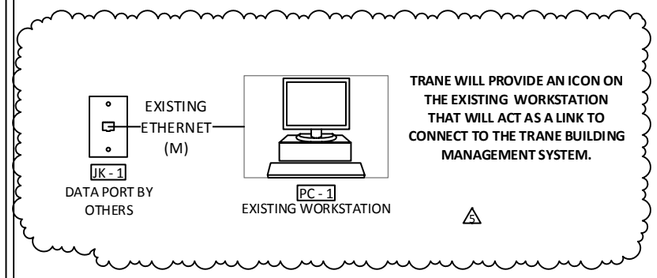
CID: 00058359	NUM.	REVISION	DATE:	BY:
PID: 00062912				
PROJECT: H434351				
SALESPERSON: R Urdanetta				
DESIGNED BY: J Ostrow				
CHECKED BY:	-	Original Submittal	3/1/2018	JPO

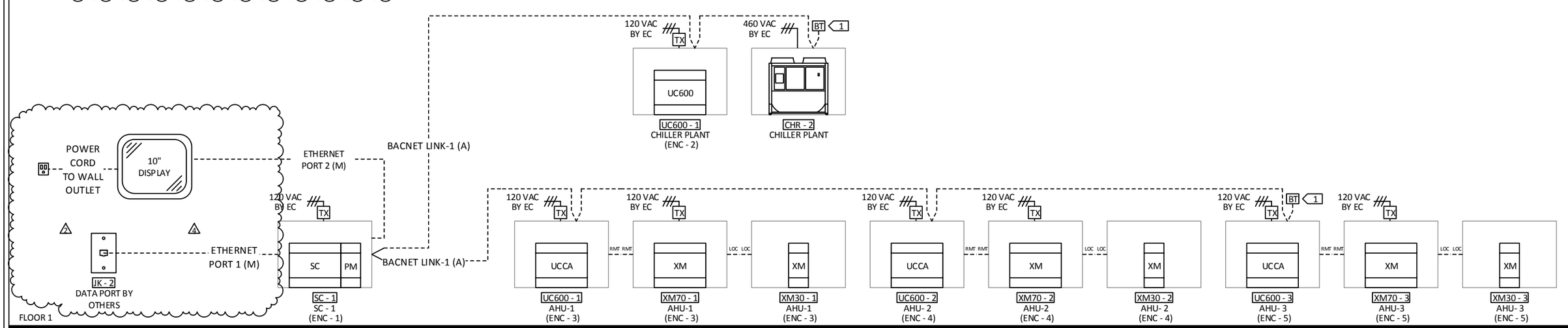
TRANE®

Miramar
2884 Corporate Way
MIRAMAR, FL 33025
954-499-6900

PROJECT: Miami Lakes Branch Library
6699 Windmill Gate Rd
MIAMI LAKES FL 33014

FILE: Miami Lakes Branch Library REV6.vsdx





1 INSTALL BACNET TERMINATORS AT EACH END OF COMMUNICATION LINK

Riser

CID: 00058359	NUM.	REVISION	DATE:	BY:
PID: 00062912				
PROJECT: H434351	5	Added Existing Computer	5/14/2018	JPO
SALESPERSON: R Urdanetta	4	Removed Wireless Router	4/30/2018	JPO
DESIGNED BY: J Ostrow	2	Added Display & Ether Switch/Router	3/23/2018	JPO
CHECKED BY:	-	Original Submittal	3/1/2018	JPO

Miramar
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FILE: Miami Lakes Branch Library REV6.vsdx

Submittal Notes:

A. The BMS user will be able to interface with the BMS system via the existing web enabled software residing in the Miami-Dade County public library system network server located at the main library in downtown Miami.

Note B Clarification: 1

B. Trane will be fully responsible for all necessary coordination required with the local Delta controls representative (if required) for the integration of the BMS system to the existing web enable software residing at the main library. Trane will be fully responsible for all associated cost to the above referenced integration.

C. The BMS will allow the user to read and write the information for all adjustable points via the web server at the main library.

D. The BMS systems will support remote access, set point adjustment, schedule changes, point overrides and graphic screens over the library wide area network and the internet.

E. The digital display touch screen located at the mechanical room will allow the user to interface with the system as described in point "D" above.

F. The system will allow any computer located within the library WAN to interface with the BMS using a standard internet browser via multitasking dynamic color graphics. Each mechanical system and control device will be depicted by point-and-click graphics.

G. Trane will be available to assist during the test and balance of the system as required or provide all tools necessary to interface the system for test and balance purposes. Training for the use of these tools will be provided as needed.

H. Trane will demonstrate the operation of the BMS system by conducting a performance test for the user acceptance of the system. Any test that fails to demonstrate the operation of the system will be repeated at a later date. All tests will be performed to the satisfaction of both the engineer and library department prior to acceptance of the control.

Additional Submittal Notes:

1. The building management system will be provided with five(5) years warranty for parts and labor as specified in the contract documents.

2. The 10-inch touch screen will be provided with custom graphics capability as part of the menu elements. 2

SUBMITTAL NOTES

CID: 00058359	NUM.	REVISION	DATE:	BY:
PID: 00062912				
PROJECT: H434351				
SALESPERSON: R Urdanetta	5	Updated Note B	5/14/2018	JPO
DESIGNED BY: J Ostrow	4	Added new notes	4/30/2018	JPO
CHECKED BY:	2	New Page	3/30/2018	JPO

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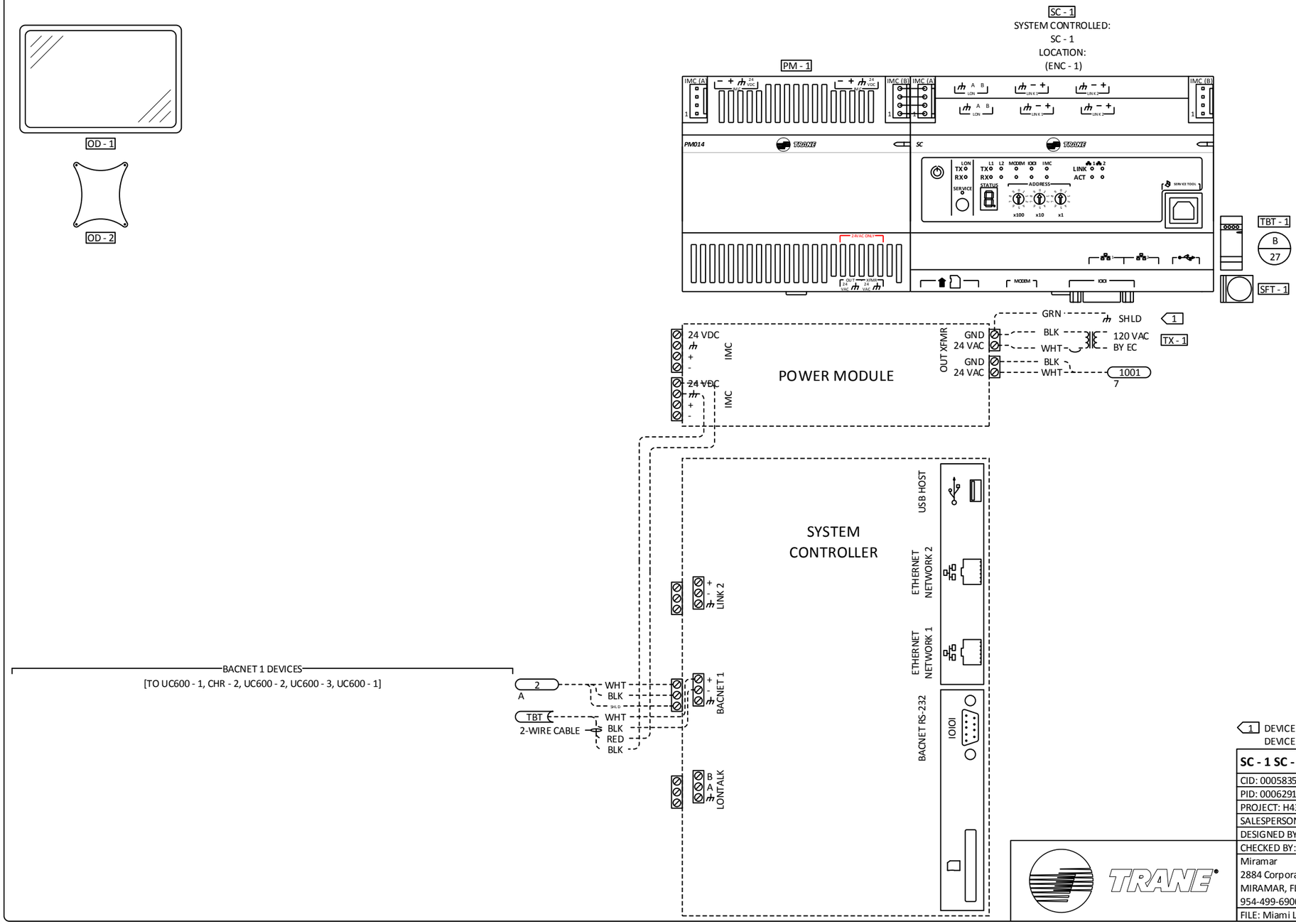
FILE: Miami Lakes Branch Library REV6.vsdx

(SC - 1)

BILL OF MATERIAL				
TAG	QTY	VENDOR	PART NO	DESCRIPTION
SFT - 1	1	TRANE	BMCF000AAA0DB00	TRACER SC 15 LICENSE
SC - 1	1	TRANE	BMSC000AAA011000	TRACER SC W/PM014
TBT - 1	1	TRANE	X13651524-01	BACNET TERMINATOR (2 PACK)
OD - 1	1	TRANE	X13760351002	TRACER 10 IN OPERATOR COLOR DISPLAY, W/VESA MOUNT, 7 FT - ETH. CABLE.



1 DEVICE MUST BE GROUNDED WITH FACTORY PROVIDED GROUND WIRE AS DETAILED IN THE DEVICE INSTALLATION LITERATURE.

SC - 1 SC - 1 CONTROLLER

CID: 00058359	NUM.	REVISION	DATE:	BY:
PID: 00062912				
PROJECT: H434351				
SALESPERSON: R Urdanetta				
DESIGNED BY: J Ostrow				
CHECKED BY:	-	Original Submittal	3/1/2018	JPO

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FILE: Miami Lakes Branch Library REV6.vsdx

Sequence of Operations
CH-1, AHU-1, AHU-2 & AHU-3

Fan Operation and Control:
New supply fans are to be interlocked with their respective AHU as required by the fan schedule. Existing exhaust fans are to be automatically started or stopped during occupied or unoccupied periods by the building automation system's (BAS) direct digital controller (DDC) according to menu driven, adjustable, weekly scheduling program, when the 'H-O-A' starter switch (which must be provided to all these existing fans) is in the 'auto' position.

Air Handling Unit (Ahu) Operation and Control:
The internal calendar and time clock of the building automation system will determine the AHU(s) run time. Upon proof of successful start and operation of the air handling units, the automatic controls are placed into operation modulating the chilled water coil valve to maintain a set air leaving air temperature condition from the AHU of55°f (adjustable). The fan speed is to be modulated through the variable frequency drive (VFD) to maintain a space temperature of 75°f (adjustable). When the scheduled air handling units are first started [thirty (30) minutes (adjustable) prior to the opening of the building], the outside air supply fans and exhaust air fans and associated motorized dampers shall remain closed/off to allow for space dehumidification. Humidity level readings shall be obtained by software calculating the dry bulb temperature sensor and the dew point temperature sensor in the main air handling unit return air duct and by wall mounted humidity sensors located in high occupant density areas(refer to floor plans for location). Once the building is scheduled for opening, the outside air supply fans/dampers, and the exhaust air fan(s)/dampers, shall turn on/open to provide the required airflow rates of outside and exhaust air. Actual amounts of outside air will be selected based on a demand control ventilation (DCV) system set by each of the individual carbon dioxide (CO2) sensor readings. When any air handling unit is stopped, its related automatic outside air modulating dampers, exhaust air fan(s), and the chilled water coil valves shall be driven closed.

Outside Air Section Control:
The outside air provisions system design requires that outside air is provided into the air conditioning system through each air handling unit.

Minimum amounts of outside air, measured by outside air airflow monitoring stations, will be set to provide 1/2 of the minimum outside air requirements listed in the contract documents (air handling unit schedule and outside air calculation) during normal operation mode. However, if carbon dioxide (CO2) levels within the building rise above 900 ppm (adjustable) as a result of an increase of occupants, the outside air flow rates will be set to gradually increase (by increasing the speed of the outside air supply fan VFD's) to the required outside air levels. The levels of CO2 within the building are to be constantly monitored by CO2 sensors located in each air handler unit main return air duct. In addition to the return air duct mounted CO2 sensors, individual wall mounted CO2 sensors shall be provided in all areas where the occupancy density is equal or more than 25 people per 1000 sf (refer to floor plans and outside air calculations for location requirements). When the CO2 levels within any of these rooms rise above 900 ppm (adjustable) and the supply fans speed is set to provide 1/2 of the minimum outside air requirements, the current control sequence shall be reset so the speed of the outside air intake fans increase until the airflow monitoring stations read match the read values with the outside air intake values listed in the air handling unit schedule.

A CO2 sensor will be located at each outside air intake of every air handling unit. If these sensors read values that create a 700 ppm (adjustable) difference between the exterior and interior readings (exterior - interior > 700 ppm), then the outside air intake will be set to deliver one half of the values scheduled in the contract documents regardless of the measured values of CO2 within the space. When the difference between the outside and inside air CO2 sensor reading levels (outside - inside is less than or equal to 700 ppm)(adjustable), then the outdoor air delivery system will be set to "normal" operation mode. This override sequence is required to prevent further contamination of the space if the outside air CO2 levels are more than the interior levels (typical during heavy traffic periods).

Each outside air ductwork dedicated to each handling unit is provided with an airflow sensor to be able to constantly monitor and control the amounts of outside air flow rates provided.

Supply Air Temperature Control:

Cooling Mode [Space Temperature Of 72.5°F (Adjustable) And Above]:
Cooling mode shall be enabled when the single zone VFD serving the affected unit is between 100% and minimum load (*). The supply air temperature, measured by a DDC controlled temperature sensor located downstream of each air handling unit's main cooling coil, shall be maintained at constant discharge temperature of 55°f (adjustable). The temperature shall be fine-tuned by adjusting the chilled water three-way modulating valve. The discharge air temperature will be gradually reset upwards to a maximum of 58°f (adjustable), through the DDC controller, if the main return air temperature falls below 70°f and the AHU fan is at its minimum setpoint. If space temperature reaches or is lower than 67.5°f, after VFD speed is at minimum load (*), heating mode (described below) will be enabled in the specific zone. The reverse will occur (switching back to cooling mode) when space temperature rises above setpoint. When any duct heater is energized while the chiller is energized, the control system, through programming, shall prevent the chiller from energizing more than two (2) compressors. The hot water valve will be closed during this mode.

Heating Mode [Space Temperature Of 67.5°F (Adjustable) And Below]:
Heating mode shall be enabled when the single zone VFD serving the affected unit is at minimum load (*). The supply air temperature, measured by a DDC controlled temperature sensor located downstream of each air handling unit's main cooling coil, shall be reset upwards at a constant discharge temperature of 58°f (adjustable). The temperature shall be fine tuned by adjusting the chilled water three-way modulating valve. If space temperature does not increase as a result of the above temperature reset sequence, hot water re-heat valve will remain closed and SCR heater will gradually energize. The reverse will occur (switching back to cooling mode) when space temperature rises above setpoint. When any duct heater is energized while the chiller is energized, the control system, through programming, shall prevent the chiller from energizing more than two (2) compressors.

Dehumidification Control Sequence:
If the return air relative humidity exceeds 60% (adjustable) and the return air temperature is above 74°f (adjustable), the DDC controller will reset the supply air temperature downwards, to 52°f (adjustable) while opening the reheat coil valve to increase dehumidification. SCR heater will gradually energize when return air temperature reaches 70°f (adjustable) to prevent overcooling of space. SCR heaters shall energize only after hot-water reheat valve is confirmed to be fully open and AHU fan speed is at its minimum load (*).

Unoccupied Humidity / Temperature Override Routine:
The unoccupied humidity / temperature override routine will start, by enabling "on" the air conditioning units (as described in the paragraph below), when the humidity / temperature in the zone served by any air handling unit exceeds 60% (adjustable) and/ or 82 degrees respectively (adjustable), at a minimum of two (2) space humidity / temperature sensors (adjustable) located within the same zone or one (1) space humidity sensor and the air handling unit return air humidity conditions (software calculated by measuring of the dry bulb and the dew point temperature).

The supply air of the air handling unit serving the affected zone shall be reset to 52 degrees (adjustable) while opening the reheat coil valve to increase dehumidification. The outside air supply fans and the exhaust air fans serving the building shall remain turned off during the off-hours humidity / temperature override routine.

Chilled Water System:
This building has been provided with two (2) chilled water pumps.
One of the pumps to be on stand-by mode at all times. Chiller controller to alternate lead/lag pumps in a manner to equalize operational running time between them all. Chiller controller will send signal to energize pump based on T.O.D. schedule. BAS to ensure that all chilled water coil valves serving the air handling units are fully open before lead chilled water pump energizes.

Hot Water System:
This building has been provided with one (1) hot water pump.
The building automation system shall enable "on" the hot water pump for a minimum of fifteen (15) seconds (adjustable) after any three-way re-heat water coil valve of any air handling unit opens and 15 seconds before chiller energizes (if chiller is de-energized at the time hot water reheat is required).

Zone Temperature Control:
A room type wall mounted temperature/humidity combination sensor, through a DDC controller, shall modulate the applicable air handling unit fan speed and, if required, gradually energize the SCR levels of heating to maintain zone temperature set point while in occupied mode. SCR duct heater shall energize only when the applicable hot water re-heat valve is fully open and AHU fan speed is reduced (fan speed is controlled by space temperature reading).

One wall mounted temperature/humidity sensors shall be provided per single zone VFD air handling unit.

Alarm and Stand-By Devices Sequence Of Operations:
When the chiller controller selected lead chilled water pump and/or hot water pump (one hot water pump provided) is scheduled to operate and proof of operation is not received, then the chiller controller shall start the sequence to energize the respective chilled water stand-by pump. Chiller controller shall immediately generate and send an alarm signal to the BAS operator workstation and assigned personnel indicating failure of affected mechanical device.

BAS is to immediately send to the BAS operator workstation and assigned personnel indicating failure of the following, but not limited to, devices when no feedback is received and/or device is not responding to control signal:
- General type exhaust fan (by means of current meters and DP switches) - exhaust fans are existing.
- Motorized damper (by means of feedback).
- Automatic chilled and hot water valves (by means of position indicator (voltage) feedback).
- Filters (by means of DP switches)
- Sensors (by means of voltage feedback),
- Hot water pump (by means of current meters and DP switches)
- Chiller and chiller components (by means of chiller controller)

(*) Minimum load is defined as the VFD setpoint where the air handling units deliver the below listed airflow rates. T&B contractor to field select this value and to coordinate with controls contractor for its proper programming into the building's automatic control system.
- AHU-1: 3000 CFM
- AHU-2: 3000 CFM
- AHU-3: 1850 CFM

Chiller 3 Way Hot Water Valve:
The hot water valve will modulate to maintain the minimum heat exchanger leaving temperature setpoint at 115 deg. F (adj.). While the heat exchanger leaving temperature is above setpoint, water will flow directly through the heat exchanger without going through the bypass valve. As the heat exchanger leaving temperature drops closer to the minimum heat exchanger leaving temperature setpoint, the bypass valve will slowly modulate so that less water flows through the heat exchanger. The bypass valve must always allow a minimum trickle flow to be present through the heat exchanger while the hot water pump is running so that the leaving hot water temperature gets an accurate reading.

CH-1, AHU-1, AHU-2 & AHU-3 SEQUENCE OF OPERATION

CID: 00058359	NUM.	REVISION	DATE:	BY:
PID: 00062912				
PROJECT: H434351	6	Removed HW Valve From Clg/Htg Seq	2/4/2019	JPO
SALESPERSON: R Urdanetta	3	Valves now state they are 3 way	4/18/2018	JPO
DESIGNED BY: J Ostrow	2	Updated Sequence	3/26/2018	JPO
CHECKED BY:	-	Original Submittal	3/1/2018	JPO

Miramar
2884 Corporate Way
MIRAMAR, FL 33025
954-499-6900

PROJECT: Miami Lakes Branch Library
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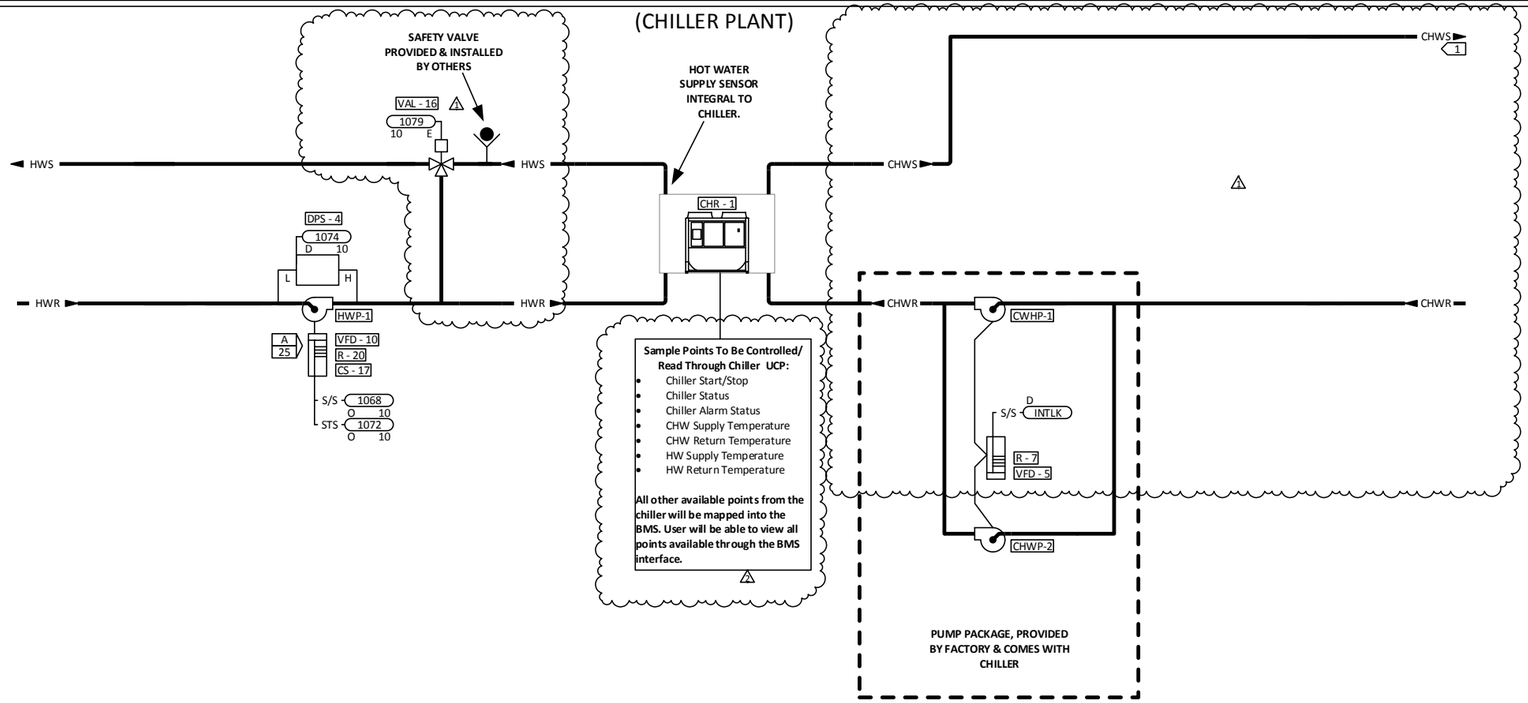
MIAMI LAKES FL 33014

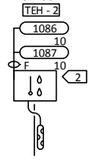
FILE: Miami Lakes Branch Library REV6.vsdx

(CHILLER PLANT)



BILL OF MATERIAL				
TAG	QTY	VENDOR	PART NO	DESCRIPTION
VAL - 16	1	BELIMO	B330 + ARB24-SR	VAL, 3-WAY, CCV/BALL, 19 CV, 1.25 IN, SS, 600 PSI BODY + ACT, PROP, 24 VAC/VDC, NSR
DPS - 4	1	KELE	24-014	DIFF PRESS SW WTR, 4 PSIG - 43.5 PSIG, SPDT, 0.25 FPT
TEH - 2	1	KELE	HO31K-T24	HUMIDITY SENS, OA, 3%, TEMP
R - 20	1	KELE	RIBU1C	RLY, SPDT, LED, 10-30 VAC/DC/120 VAC, 10 A
CS - 17	1	KELE	RIBXGTA	CUR SW, 0.75-150A, SPLIT, NO

OUTDOOR TEMP/HUMIDITY SENSOR



A

2 MOUNT OUTDOOR AIR TEMP SENSOR ON NORTHERN EXPOSURE USING A NON-CONDENSATING CONDUIT CONNECTION. CONSULT WITH PROJECT MANAGER BEFORE MOUNTING.

1 SCHEMATIC CONTROL FLOW DIAGRAM ONLY. SEE MECHANICAL DRAWINGS FOR PIPING DETAILS.

CHILLER PLANT UC600 - 1 FLOW

CID: 00058359	NUM.	REVISION	DATE:	BY:
PID: 00062912				
PROJECT: H434351				
SALESPERSON: R Urdanetta	2	All points available in BMS	3/23/2018	JPO
DESIGNED BY: J Ostrow	1	CV System Now, Added HW 3 Way Valve	3/14/2018	JPO
CHECKED BY:	-	Original Submittal	3/1/2018	JPO

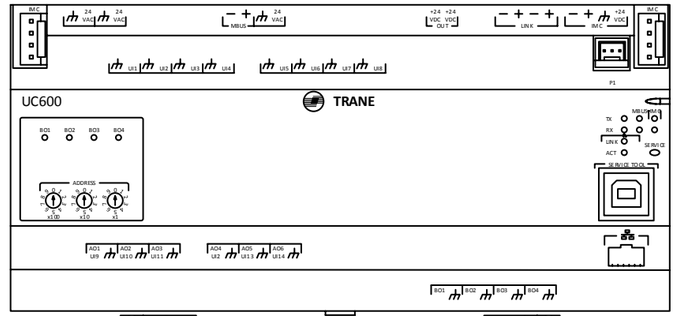
Miramar
2884 Corporate Way
MIRAMAR, FL 33025
954-499-6900

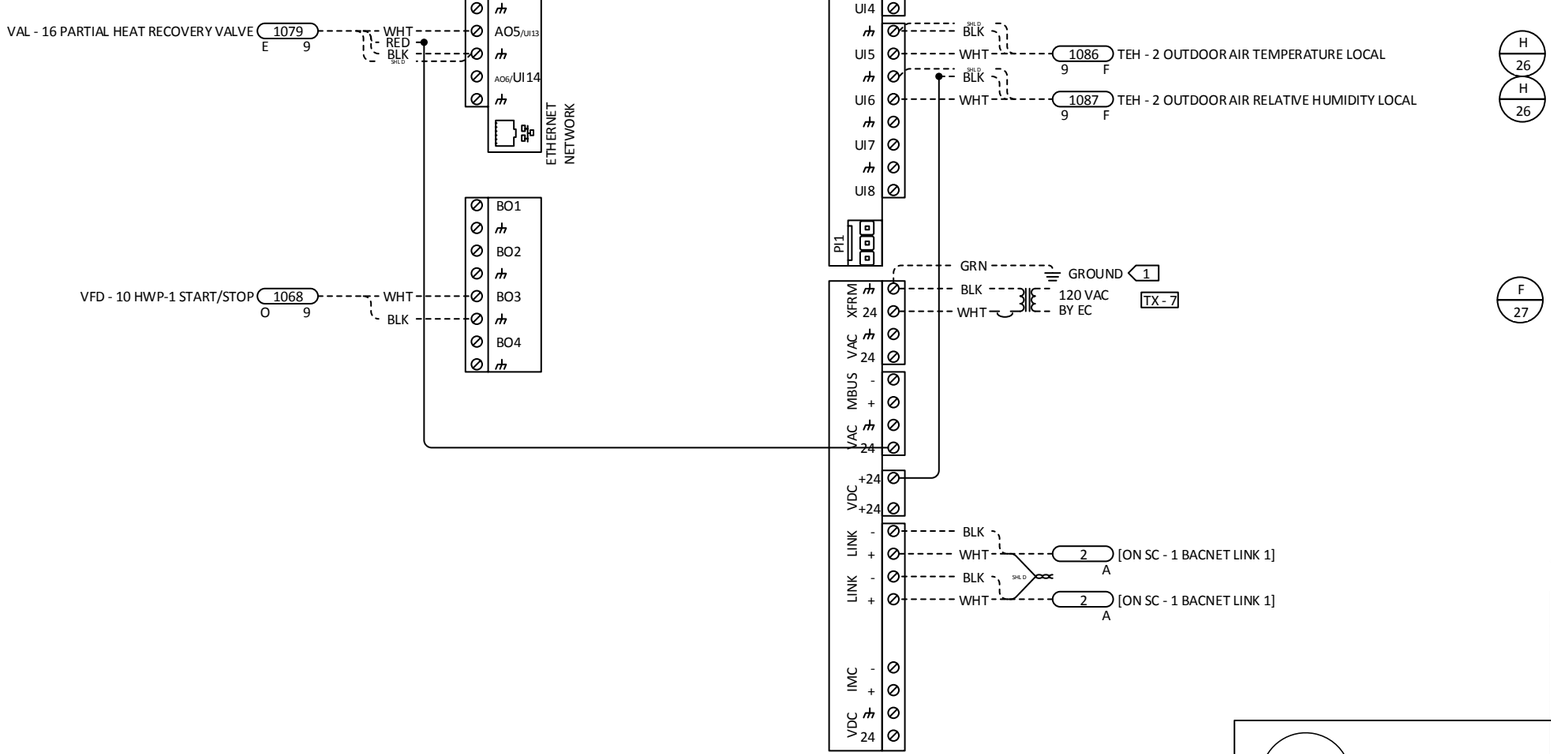
PROJECT: Miami Lakes Branch Library
6699 Windmill Gate Rd
MIAMI LAKES FL 33014

FILE: Miami Lakes Branch Library REV6.vsdx

(CHILLER PLANT)

BILL OF MATERIAL				
TAG	QTY	VENDOR	PART NO	DESCRIPTION
UC600 - 1	1	TRANE	BMUC600AAA0100011	UC600 CONTROLLER, DIN RAIL MOUNT
TX - 7	1	KELE	TR75VA002	XFMR, 120:24VAC, 75VA, CB





1 DEVICE MUST BE GROUNDED WITH FACTORY PROVIDED GROUND WIRE AS DETAILED IN THE DEVICE INSTALLATION LITERATURE.

CHILLER PLANT UC600 - 1 CONTROLLER

CID: 00058359	NUM.	REVISION	DATE:	BY:
PID: 00062912				
PROJECT: H434351				
SALESPERSON: R Urdanetta				
DESIGNED BY: J Ostrow				
CHECKED BY:	-	Original Submittal	3/1/2018	JPO

TRANE

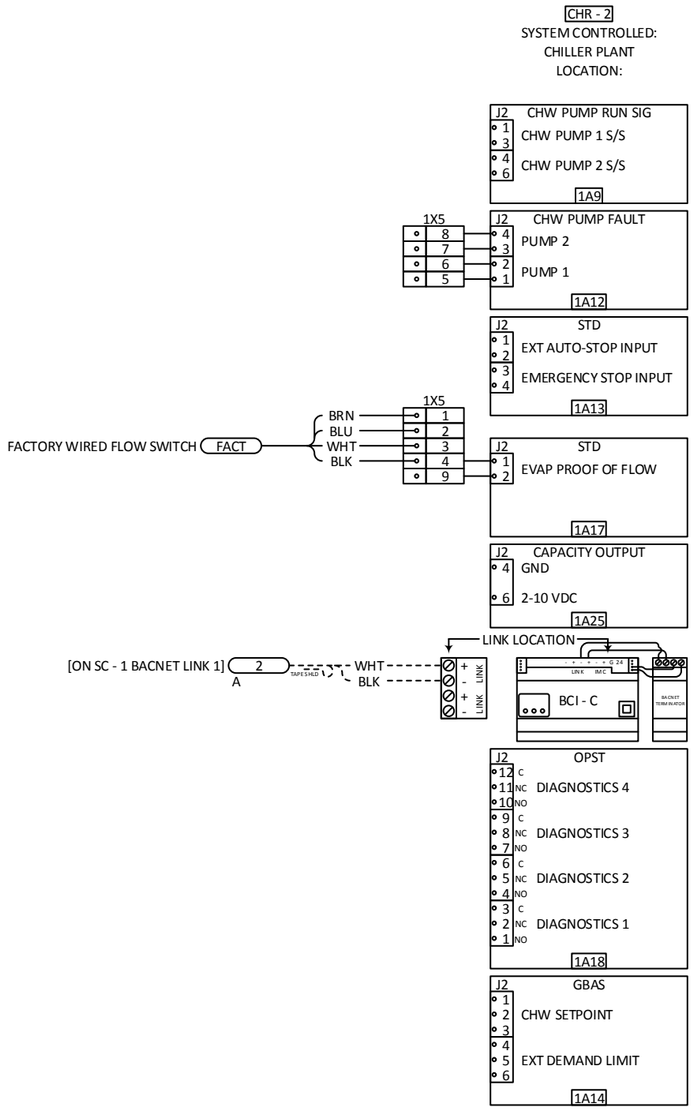
Miramar
2884 Corporate Way
MIRAMAR, FL 33025
954-499-6900

PROJECT: Miami Lakes Branch Library
6699 Windmill Gate Rd
MIAMI LAKES FL 33014

FILE: Miami Lakes Branch Library REV6.vsdx

(CHILLER PLANT)

BILL OF MATERIAL				
TAG	QTY	VENDOR	PART NO	DESCRIPTION

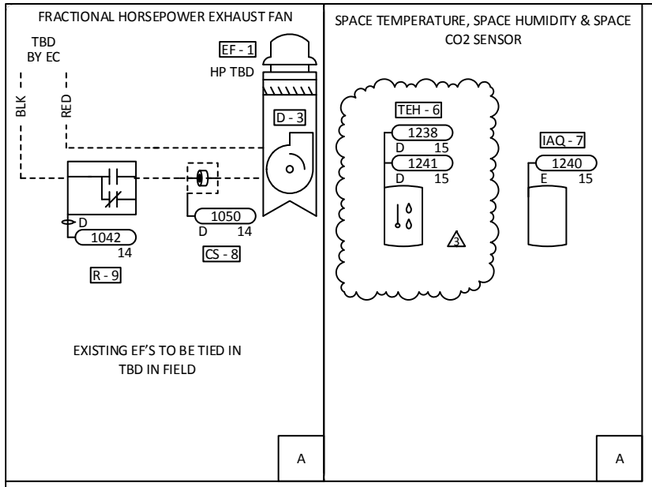


CHILLER PLANT CHR - 2 CONTROLLER

CID: 00058359	NUM.	REVISION	DATE:	BY:
PID: 00062912				
PROJECT: H434351				
SALESPERSON: R Urdanetta				
DESIGNED BY: J Ostrow				
CHECKED BY:	-	Original Submittal	3/1/2018	JPO

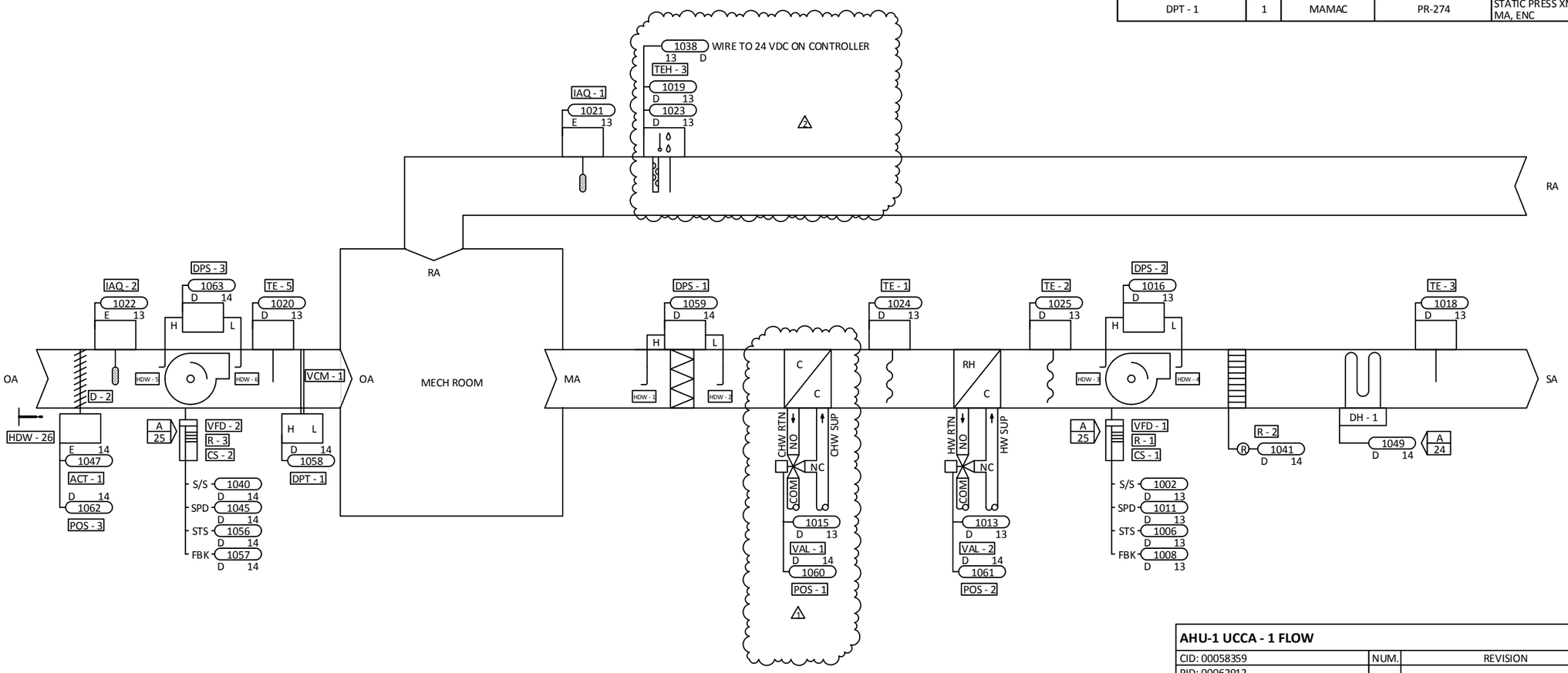
TRANE

Miramar	PROJECT: Miami Lakes Branch Library
2884 Corporate Way	
MIRAMAR, FL 33025	6699 Windmill Gate Rd
954-499-6900	MIAMI LAKES FL 33014
FILE: Miami Lakes Branch Library REV6.vsdx	DWG 11 OF 31



(AHU-1)

BILL OF MATERIAL				
TAG	QTY	VENDOR	PART NO	DESCRIPTION
HDW - 26	1	TRANE	ROD00856	ANTI-SPIN ROD
IAQ - 7	1	TRANE	X13790422010	IAQ SENS, CO2, WALL
IAQ - 1, IAQ - 2	2	TRANE	X13790423010	IAQ SENS, CO2, DUCT
TEH - 6	1	TRANE	X1379044401	HUMIDITY SENS, ROOM, 3%, TEMP
VAL - 2	1	BELIMO	B317 + LRB24-SR	VAL, 3-WAY, CCV/BALL, 4.7 CV, 0.75 IN, SS, 600 PSI BODY + ACT, PROP, 24 VAC/VDC, NSR
VAL - 1	1	BELIMO	B330 + ARB24-SR	VAL, 3-WAY, CCV/BALL, 19 CV, 1.25 IN, SS, 600 PSI BODY + ACT, PROP, 24 VAC/VDC, NSR
ACT - 1	1	BELIMO	LMB24-SR	ACT, PROP, 24 VAC/VDC, 45 IN-LB, NSR
HDW - 1, HDW - 2, HDW - 3, HDW - 4, HDW - 5, HDW - 6	6	KELE	21122	STATIC PRESSURE TIP
TEH - 3	1	KELE	DP4A-D	DUCT DEW POINT AND DRY BULB TRANSMITTER
VCM - 1	1	KELE	FXP-XX	AIR FLOW SENSOR
DPS - 1, DPS - 2, DPS - 3	3	KELE	RFS-4001-031	DIFFERENTIAL PRESSURE SWITCH, 0.15 - 5.0 WC
R - 9	1	KELE	RIB2401B	RLY, SPDT 24/120 VAC/24 VDC, 20 A
R - 2, R - 3	2	KELE	RIBU1C	RLY, SPDT, LED, 10-30 VAC/DC/120 VAC, 10 A
CS - 1, CS - 2	2	KELE	RIBXGTA	CUR SW, 0.75-150A, SPLIT, NO
CS - 8	1	KELE	RIBXKTF	CUR SW, 0.25-150A, SOLID, NO
TE - 3, TE - 5	2	KELE	ST-D24-XH	TEMP SENS, DUCT/IMM, THERM, 9 IN, HB
TE - 1, TE - 2	2	KELE	ST-FZR24-36	RIGID AVERAGING THERMISTOR AND RTD SENSOR
DPT - 1	1	MAMAC	PR-274	STATIC PRESS XMTR, MULTIRANGE, 4-20 MA, ENC



AHU-1 UCCA - 1 FLOW				
CID: 00058359	NUM.	REVISION	DATE:	BY:
PID: 00062912				
PROJECT: H434351	3	Changed space temp/humidity sensor	4/18/2018	JPO
SALESPERSON: R Urdanetta	2	Added Combo Dewpoint/Temp Sensor	3/26/2018	JPO
DESIGNED BY: J Ostrow	1	CHW Valves Are Now 3 Way	3/14/2018	JPO
CHECKED BY:	-	Original Submittal	3/1/2018	JPO

Miramar
2884 Corporate Way
MIRAMAR, FL 33025
954-499-6900

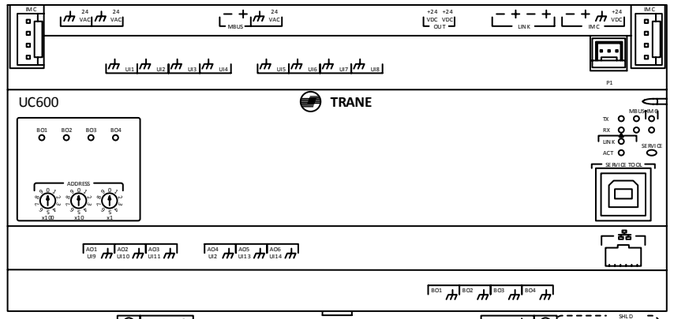
PROJECT: Miami Lakes Branch Library

6699 Windmill Gate Rd
MIAMI LAKES FL 33014

FILE: Miami Lakes Branch Library REV6.vsdx

(AHU-1)

BILL OF MATERIAL				
TAG	QTY	VENDOR	PART NO	DESCRIPTION
UC600 - 1	1	TRANE	BMUC600AAA0100011	UC600 CONTROLLER, DIN RAIL MOUNT



UC600 - 1
SYSTEM CONTROLLED:
AHU-1
LOCATION:
(ENC - 3)

VFD - 1 SUPPLY FAN VFD STATUS 1006 D 12 — WHT, BLK (SHLD) — AO1/UI9
VFD - 1 SUPPLY FAN VFD FEEDBACK 1008 D 12 — WHT, BLK (SHLD) — AO2/UI10
VFD - 1 SUPPLY FAN SPEED COMMAND TB6 - 2 12 — WHT — AO3/UI11
VAL - 2 HEATING OUTPUT COMMAND 1013 D 12 — WHT, BLK — AO4/UI12
VAL - 1 COOLING OUTPUT COMMAND 1015 D 12 — WHT, BLK — AO5/UI13
DPS - 2 SUPPLY AIR FAN STATUS OPEN 1016 D 12 — WHT, BLK (SHLD) — AO6/UI14
ETHERNET NETWORK
VFD - 1 SUPPLY FAN START STOP COMMAND TB6 - 1 12 — WHT — BO1, BO2, BO3, BO4

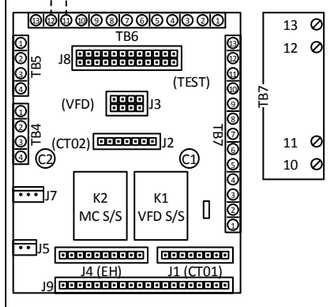
D 26
B 26
D 27

UI1 — BLK (SHLD), WHT — 1018 12 D — TE - 3 SUPPLY AIR TEMPERATURE
UI2 — BLK (SHLD), WHT — 1019 12 D — TEH - 3 TEMPERATURE AND DEWPOINT LOCAL TEMPERATURE
UI3 — BLK (SHLD), WHT — 1020 12 D — TE - 5 OUTSIDE AIR TEMPERATURE
UI4 — BLK (SHLD), RED, WHT — 1021 12 E — IAQ - 1 RETURN AIR CO2
UI5 — BLK (SHLD), RED, WHT — 1022 12 E — IAQ - 2 OUTSIDE AIR CO2
UI6 — BLK (SHLD), WHT — 1023 12 D — TEH - 3 TEMPERATURE AND DEWPOINT LOCAL HUMIDITY
UI7 — BLK (SHLD), WHT — 1024 12 D — TE - 1 COOLING COIL LEAVING TEMPERATURE
UI8 — BLK (SHLD), WHT — 1025 12 D — TE - 2 HEATING COIL LEAVING TEMPERATURE

B 28
C 27
B 28
F 26
F 26
C 27

PI1

XFRM 24 — GRN — GROUND 1; BLK, WHT — 120 VAC BY EC — TX - 2
VAC 24
MBUS - +
VAC 24
VDC +24 +24 — WHT — 1038
LINK - + — BLK, WHT — 2 A [ON SC - 1 BACNET LINK 1]
LINK - + — BLK, WHT — 2 A [ON SC - 1 BACNET LINK 1]
IMC - +
VDC 24 — BLK, WHT — 9 A (TAPES HLD) [TO XM70 - 1, XM30 - 1]



UCCA TERMINAL BOARD

Remove Factory Power Connection Terminal J5. Will Use UC600 to Power UCCA Terminal Board.

1 DEVICE MUST BE GROUNDED WITH FACTORY PROVIDED GROUND WIRE AS DETAILED IN THE DEVICE INSTALLATION LITERATURE.

AHU-1 UCCA - 1 CONTROLLER

	NUM.	REVISION	DATE:	BY:
CID: 00058359				
PID: 00062912				
PROJECT: H434351				
SALESPERSON: R Urdanetta				
DESIGNED BY: J Ostrow				
CHECKED BY:	-	Original Submittal	3/1/2018	JPO

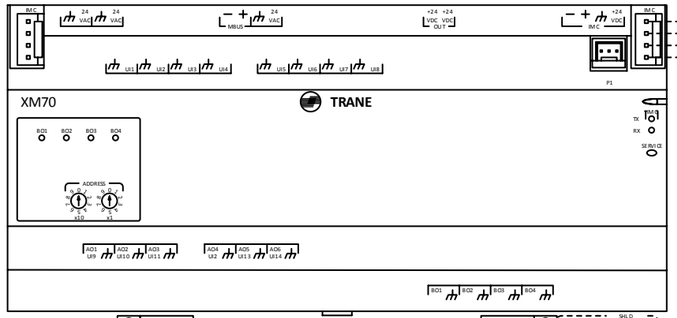
Miramar
2884 Corporate Way
MIRAMAR, FL 33025
954-499-6900

PROJECT: Miami Lakes Branch Library
6699 Windmill Gate Rd
MIAMI LAKES FL 33014

FILE: Miami Lakes Branch Library REV6.vsdx

(AHU-1)

BILL OF MATERIAL				
TAG	QTY	VENDOR	PART NO	DESCRIPTION
XM70 - 1	1	TRANE	X13651568010	XM70, 19 POINT EXPANSION MODULE
TX - 3	1	KELE	TR75VA002	XFMR, 120:24VAC, 75VA, CB



XM70 - 1
SYSTEM CONTROLLED:
AHU-1
LOCATION:
(ENC - 3)

GRY
BLU
BLK
RED
9 [ON UC600 - 1 IMC]

A 26

VFD - 2 SF-1 VFD SPEED 1045 D 12 — WHT, BLK (SHLD) → AO1/UI9
ACT - 1 OUTSIDE AIR DAMPER ACTUATOR 1047 E 12 — WHT, RED, BLK (SHLD) → AO2/UI10
ELECTRIC DUCT HEATER MODULATION 1049 D 12 — WHT, BLK (SHLD) → AO3/UI11
CS - 8 EF-1 CURRENT RELAY STATUS 1050 D 12 — WHT, BLK (SHLD) → AO4/UI12
AO5/UI13
AO6/UI14

E 26

A 28
H 27

VFD - 2 SF-1 VFD START/STOP 1040 D 12 — WHT, BLK → BO1
R - 2 IONIZATION MODULE COMMAND 1041 D 12 — WHT, BLK → BO2
R - 9 EF-1 RELAY COMMAND 1042 D 12 — WHT, BLK → BO3
BO4

UI1 — BLK (SHLD), WHT → 1056 12 D — VFD - 2 SF-1 VFD STATUS
UI2 — BLK (SHLD), WHT → 1057 12 D — VFD - 2 SF-1 VFD FEEDBACK
UI3 — BLK (SHLD), WHT → 1058 12 D — DPT - 1 OUTSIDE AIR FLOW
UI4 — BLK (SHLD), WHT → 1059 12 D — DPS - 1 SUPPLY AIR FILTER STATUS OPEN
UI5 — BLK (SHLD), WHT → 1060 12 D — POS - 1 COOLING COIL VALVE POSITION FEEDBACK
UI6 — BLK (SHLD), WHT → 1061 12 D — POS - 2 HEATING COIL VALVE POSITION FEEDBACK
UI7 — BLK (SHLD), WHT → 1062 12 D — POS - 3 OUTSIDE AIR DAMPER POSITION FEEDBACK
UI8 — BLK (SHLD), WHT → 1063 12 D — DPS - 3 OUTSIDE AIR FAN STATUS OPEN

E 27
D 27
D 27

P11

XFRM 24 VAC
GRN → GROUND 1
BLK, WHT → 120 VAC BY EC — TX - 3
BLK, WHT → 1065 15 — 24VAC POWER FOR XM30 - 1

F 27

VDC 24

IMC - / + / VDC 24
BLK, WHT (SHLD) → 9 A — [ON UC600 - 1 IMC]

1 DEVICE MUST BE GROUNDED WITH FACTORY PROVIDED GROUND WIRE AS DETAILED IN THE DEVICE INSTALLATION LITERATURE.

AHU-1 XM70 - 1 CONTROLLER

CID: 00058359	NUM.	REVISION	DATE:	BY:
PID: 00062912				
PROJECT: H434351				
SALESPERSON: R Urdanetta				
DESIGNED BY: J Ostrow				
CHECKED BY:	-	Original Submittal	3/1/2018	JPO

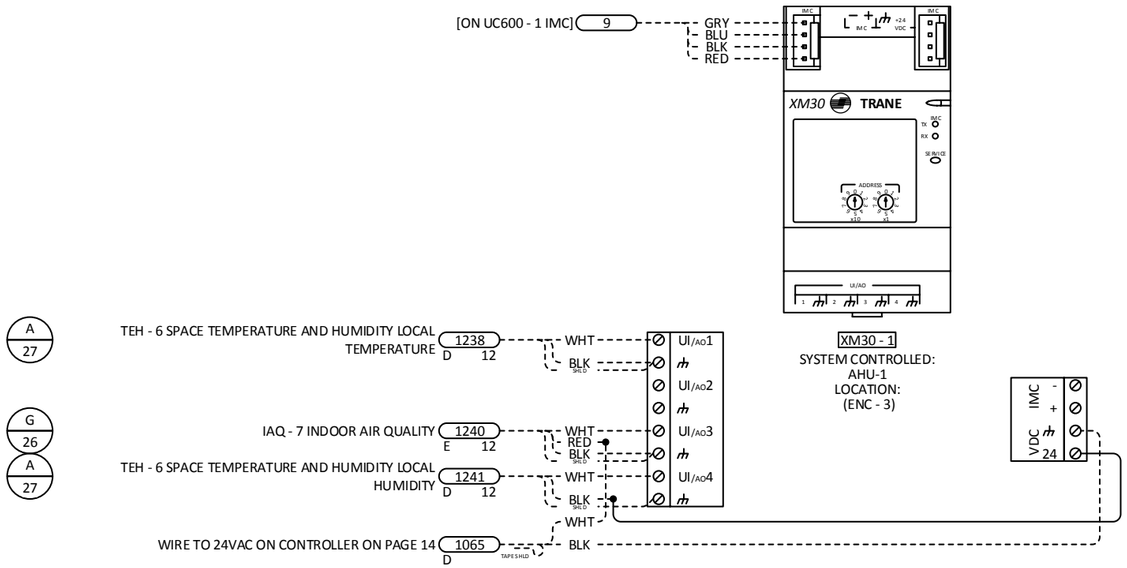
Miramar
2884 Corporate Way
MIRAMAR, FL 33025
954-499-6900

PROJECT: Miami Lakes Branch Library
6699 Windmill Gate Rd
MIAMI LAKES FL 33014

FILE: Miami Lakes Branch Library REV6.vsdx

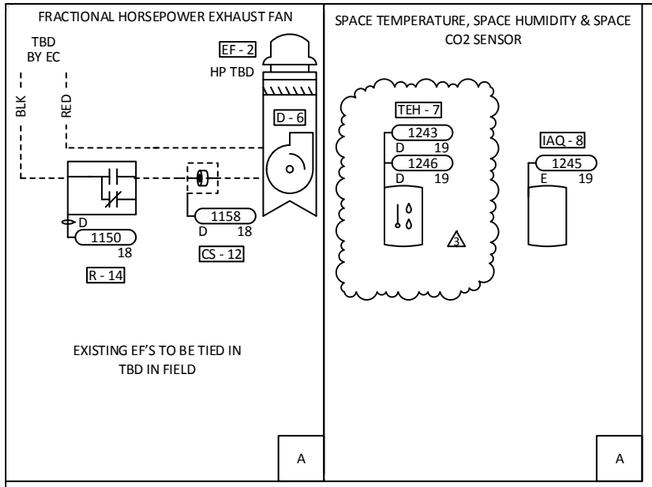
(AHU-1)

BILL OF MATERIAL				
TAG	QTY	VENDOR	PART NO	DESCRIPTION
XM30 - 1	1	TRANE	X13651537010	XM30, 4 POINT UI/AO EXPANSION MODULE

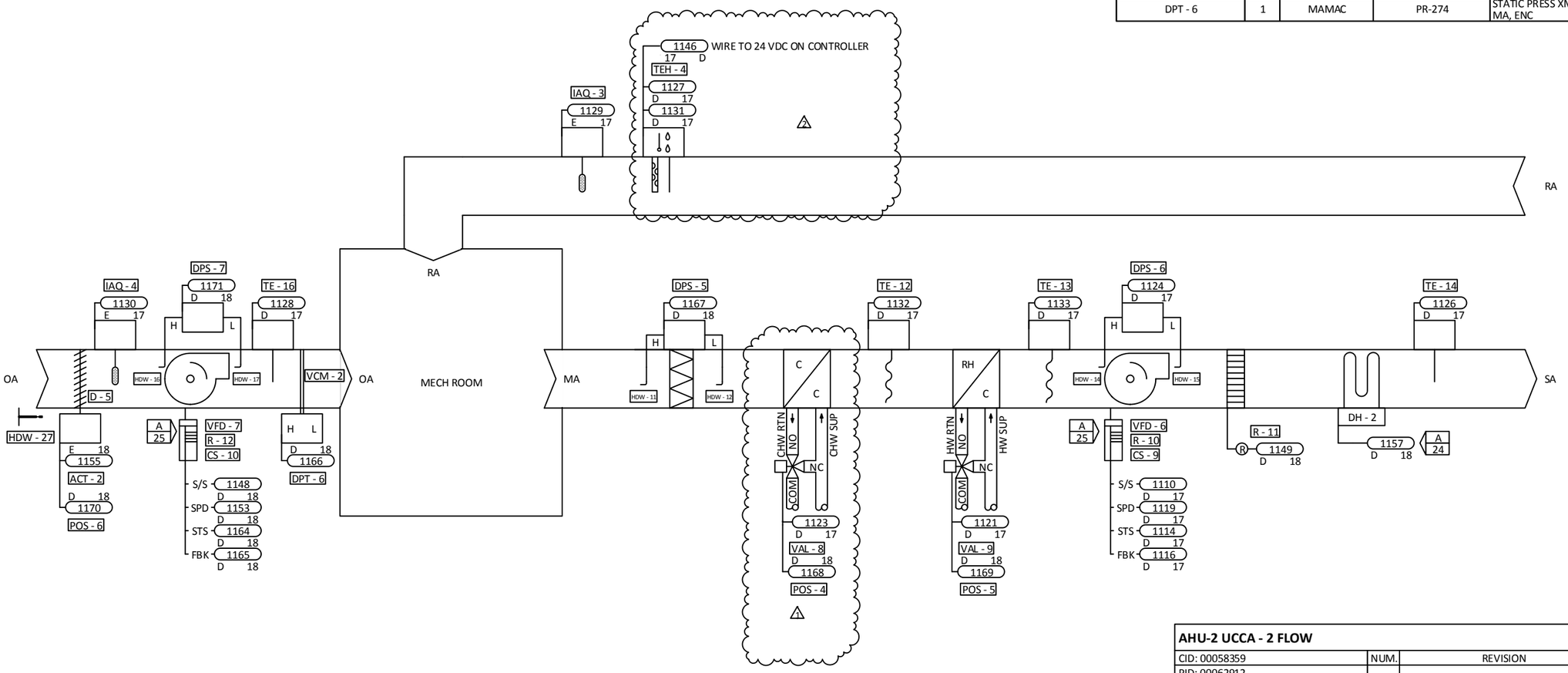


AHU-1 XM30 - 1 CONTROLLER				
CID: 00058359	NUM.	REVISION	DATE:	BY:
PID: 00062912				
PROJECT: H434351				
SALESPERSON: R Urdanetta				
DESIGNED BY: J Ostrow				
CHECKED BY:				
Miramar 2884 Corporate Way MIRAMAR, FL 33025 954-499-6900	PROJECT: Miami Lakes Branch Library 6699 Windmill Gate Rd MIAMI LAKES FL 33014			
FILE: Miami Lakes Branch Library REV6.vsdx			DWG 15 OF 31	

(AHU- 2)



BILL OF MATERIAL				
TAG	QTY	VENDOR	PART NO	DESCRIPTION
HDW - 27	1	TRANE	ROD00856	ANTI-SPIN ROD
IAQ - 8	1	TRANE	X13790422010	IAQ SENS, CO2, WALL
IAQ - 3, IAQ - 4	2	TRANE	X13790423010	IAQ SENS, CO2, DUCT
TEH - 7	1	TRANE	X1379044401	HUMIDITY SENS, ROOM, 3%, TEMP
VAL - 9	1	BELIMO	B317 + LRB24-SR	VAL, 3-WAY, CCV/BALL, 4.7 CV, 0.75 IN, SS, 600 PSI BODY + ACT, PROP, 24 VAC/VDC, NSR
VAL - 8	1	BELIMO	B330 + ARB24-SR	VAL, 3-WAY, CCV/BALL, 19 CV, 1.25 IN, SS, 600 PSI BODY + ACT, PROP, 24 VAC/VDC, NSR
ACT - 2	1	BELIMO	LMB24-SR	ACT, PROP, 24 VAC/VDC, 45 IN-LB, NSR
HDW - 11, HDW - 12, HDW - 14, HDW - 15, HDW - 16, HDW - 17	6	KELE	21122	STATIC PRESSURE TIP
TEH - 4	1	KELE	DP4A-D	DUCT DEW POINT AND DRY BULB TRANSMITTER
VCM - 2	1	KELE	FXP-XX	AIR FLOW SENSOR
DPS - 5, DPS - 6, DPS - 7	3	KELE	RFS-4001-031	DIFFERENTIAL PRESSURE SWITCH, 0.15 - 5.0 WC
R - 14	1	KELE	RIB2401B	RLY, SPDT 24/120 VAC/24 VDC, 20 A
R - 11, R - 12	2	KELE	RIBU1C	RLY, SPDT, LED, 10-30 VAC/DC/120 VAC, 10 A
CS - 10, CS - 9	2	KELE	RIBXGTA	CUR SW, 0.75-150A, SPLIT, NO
CS - 12	1	KELE	RIBXKTF	CUR SW, 0.25-150A, SOLID, NO
TE - 14, TE - 16	2	KELE	ST-D24-XH	TEMP SENS, DUCT/IMM, THERM, 9 IN, HB
TE - 12, TE - 13	2	KELE	ST-FZR24-36	RIGID AVERAGING THERMISTOR AND RTD SENSOR
DPT - 6	1	MAMAC	PR-274	STATIC PRESS XMTR, MULTIRANGE, 4-20 MA, ENC



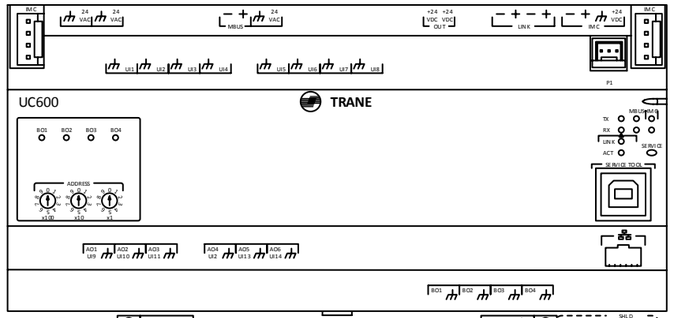
AHU-2 UCCA - 2 FLOW

CID: 00058359	NUM.	REVISION	DATE:	BY:
PID: 00062912				
PROJECT: H434351	3	Changed space temp/humidity sensor	4/18/2018	JPO
SALESPERSON: R Urdanetta	2	Added Combo Dewpoint/Temp Sensor	3/26/2018	JPO
DESIGNED BY: J Ostrow	1	CHW Valves Are Now 3 Way	3/14/2018	JPO
CHECKED BY:	-	Original Submittal	3/1/2018	JPO

Miramar 2884 Corporate Way MIRAMAR, FL 33025 954-499-6900	PROJECT: Miami Lakes Branch Library 6699 Windmill Gate Rd MIAMI LAKES FL 33014
FILE: Miami Lakes Branch Library REV6.vsdx	DWG 16 OF 31

(AHU- 2)

BILL OF MATERIAL				
TAG	QTY	VENDOR	PART NO	DESCRIPTION
UC600 - 2	1	TRANE	BMUC600AAA0100011	UC600 CONTROLLER, DIN RAIL MOUNT



UC600 - 2
SYSTEM CONTROLLED:
AHU- 2
LOCATION:
(ENC - 4)

VFD - 6 SUPPLY FAN VFD STATUS — 1114 D 16 — WHT / BLK (SHLD) — AO1/UI9
VFD - 6 SUPPLY FAN VFD FEEDBACK — 1116 D 16 — WHT / BLK (SHLD) — AO2/UI10
VFD - 6 SUPPLY FAN SPEED COMMAND — TB6 - 2 16 — WHT — AO3/UI11
VAL - 9 HEATING OUTPUT COMMAND — 1121 D 16 — WHT / BLK — AO4/UI12
VAL - 8 COOLING OUTPUT COMMAND — 1123 D 16 — WHT / BLK — AO5/UI13
DPS - 6 SUPPLY AIR FAN STATUS OPEN — 1124 D 16 — WHT / BLK (SHLD) — AO6/UI14
ETHERNET NETWORK
VFD - 6 SUPPLY FAN START STOP COMMAND — TB6 - 1 16 — WHT — BO1, BO2, BO3, BO4

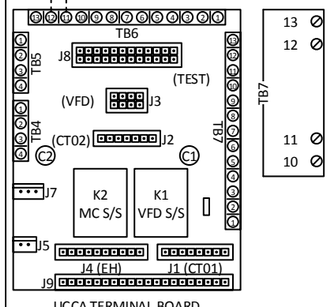
D 26
B 26
D 27

UI1 — BLK (SHLD) / WHT — 1126 16 D — TE - 14 SUPPLY AIR TEMPERATURE
UI2 — BLK (SHLD) / WHT — 1127 16 D — TEH - 4 TEMPERATURE AND DEWPOINT LOCAL TEMPERATURE
UI3 — BLK (SHLD) / WHT — 1128 16 D — TE - 16 OUTSIDE AIR TEMPERATURE
UI4 — BLK (SHLD) / RED / WHT — 1129 16 E — IAQ - 3 RETURN AIR CO2
UI5 — BLK (SHLD) / RED / WHT — 1130 16 E — IAQ - 4 OUTSIDE AIR CO2
UI6 — BLK (SHLD) / WHT — 1131 16 D — TEH - 4 TEMPERATURE AND DEWPOINT LOCAL HUMIDITY
UI7 — BLK (SHLD) / WHT — 1132 16 D — TE - 12 COOLING COIL LEAVING TEMPERATURE
UI8 — BLK (SHLD) / WHT — 1133 16 D — TE - 13 HEATING COIL LEAVING TEMPERATURE

B 28
C 27
B 28
F 26
F 26
C 27

PI1

XFRM 24 — GRN — GROUND 1; BLK / WHT — 120 VAC BY EC — TX - 9
VAC 24 — BLK / WHT — 1145 19 — 24VAC POWER FOR XM30 - 2
MBUS - + — VAC 24
VDC +24 +24 — WHT — 1146
LINK - + — BLK / WHT — 2 A — [ON SC - 1 BACNET LINK 1]
LINK - + — BLK / WHT — 2 A — [ON SC - 1 BACNET LINK 1]
IMC - + — VDC 24 — BLK / WHT — 14 A — [TO XM70 - 2, XM30 - 2]



UCCA TERMINAL BOARD

Remove Factory Power Connection Terminal J5. Will Use UC600 to Power UCCA Terminal Board.

1 DEVICE MUST BE GROUNDED WITH FACTORY PROVIDED GROUND WIRE AS DETAILED IN THE DEVICE INSTALLATION LITERATURE.

AHU-2 UCCA - 2 CONTROLLER

	NUM.	REVISION	DATE:	BY:
CID: 00058359				
PID: 00062912				
PROJECT: H434351				
SALESPERSON: R Urdanetta				
DESIGNED BY: J Ostrow				
CHECKED BY:	-	Original Submittal	3/1/2018	JPO

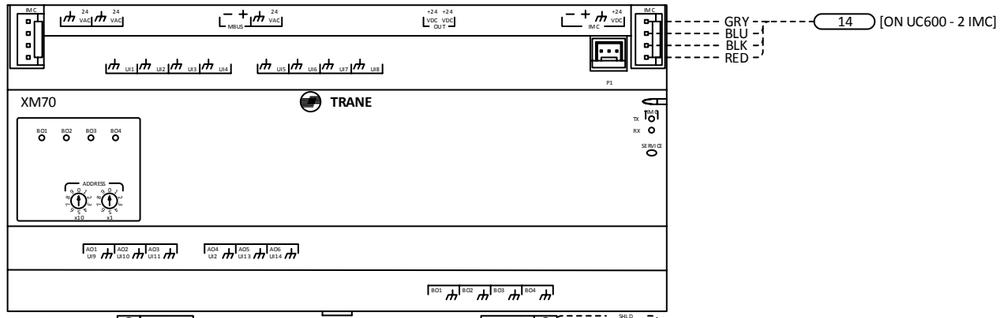
Miramar
2884 Corporate Way
MIRAMAR, FL 33025
954-499-6900

PROJECT: Miami Lakes Branch Library
6699 Windmill Gate Rd
MIAMI LAKES FL 33014

FILE: Miami Lakes Branch Library REV6.vsdx

(AHU-2)

BILL OF MATERIAL				
TAG	QTY	VENDOR	PART NO	DESCRIPTION
XM70 - 2	1	TRANE	X13651568010	XM70, 19 POINT EXPANSION MODULE
TX - 3	1	KELE	TR75VA002	XFMR, 120:24VAC, 75VA, CB



GRY, BLU, BLK, RED → 14 [ON UC600 - 2 IMC]

XM70 - 2
SYSTEM CONTROLLED:
AHU-2
LOCATION:
(ENC - 4)

A 26

VFD - 7 SF-1 VFD SPEED 1153 D 16 — WHT, BLK (SHLD) → AO1/UI9

ACT - 2 OUTSIDE AIR DAMPER ACTUATOR 1155 E 16 — WHT, RED, BLK (SHLD) → AO2/UI10

ELECTRIC DUCT HEATER MODULATION 1157 D 16 — WHT, BLK (SHLD) → AO3/UI11

E 26

CS - 12 EF-1 CURRENT RELAY STATUS 1158 D 16 — WHT, BLK (SHLD) → AO4/UI12

AO5/UI13

AO6/UI14

A 28 / H 27

VFD - 7 SF-1 VFD START/STOP 1148 D 16 — WHT, BLK → BO1

R - 11 IONIZATION MODULE COMMAND 1149 D 16 — WHT, BLK → BO2

R - 14 EF-1 RELAY COMMAND 1150 D 16 — WHT, BLK → BO3

BO4

UI1 ← BLK (SHLD), WHT ← 1164 16 D — VFD - 7 SF-1 VFD STATUS

UI2 ← BLK (SHLD), WHT ← 1165 16 D — VFD - 7 SF-1 VFD FEEDBACK

UI3 ← BLK (SHLD), WHT ← 1166 16 D — DPT - 6 OUTSIDE AIR FLOW

E 27 / D 27

UI4 ← BLK (SHLD), WHT ← 1167 16 D — DPS - 5 SUPPLY AIR FILTER STATUS OPEN

UI5 ← BLK (SHLD), WHT ← 1168 16 D — POS - 4 COOLING COIL VALVE POSITION FEEDBACK

UI6 ← BLK (SHLD), WHT ← 1169 16 D — POS - 5 HEATING COIL VALVE POSITION FEEDBACK

UI7 ← BLK (SHLD), WHT ← 1170 16 D — POS - 6 OUTSIDE AIR DAMPER POSITION FEEDBACK

D 27

UI8 ← WHT ← 1171 16 D — DPS - 7 OUTSIDE AIR FAN STATUS OPEN

PI1

XFRM 24 / VAC 24 ← GRN → GROUND 1; BLK, WHT → 120 VAC BY EC TX - 3

F 27

VDC 24 / 24

IMC - / + ← BLK, WHT (SHLD) ← 14 A [ON UC600 - 2 IMC]

VDC 24

1 DEVICE MUST BE GROUNDED WITH FACTORY PROVIDED GROUND WIRE AS DETAILED IN THE DEVICE INSTALLATION LITERATURE.

AHU-2 XM70 - 2 CONTROLLER

CID: 00058359	NUM.	REVISION	DATE:	BY:
PID: 00062912				
PROJECT: H434351				
SALESPERSON: R Urdanetta				
DESIGNED BY: J Ostrow				
CHECKED BY:	-	Original Submittal	3/1/2018	JPO

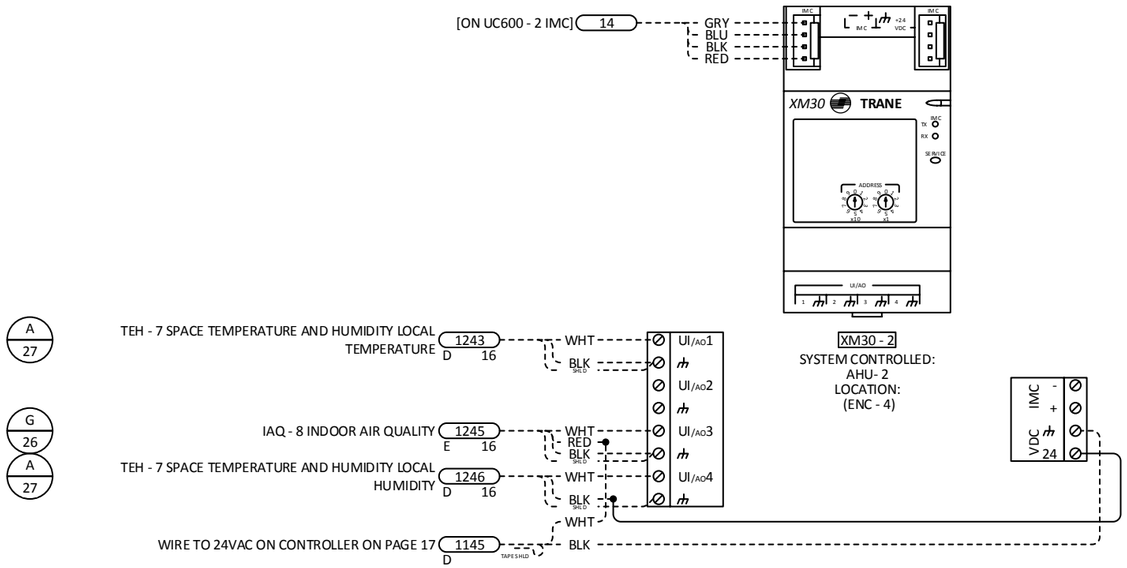
Miramar
2884 Corporate Way
MIRAMAR, FL 33025
954-499-6900

PROJECT: Miami Lakes Branch Library
6699 Windmill Gate Rd
MIAMI LAKES FL 33014

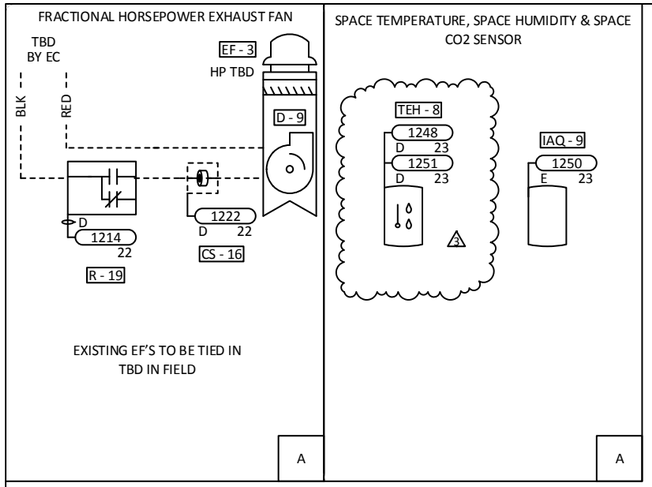
FILE: Miami Lakes Branch Library REV6.vsdx

(AHU- 2)

BILL OF MATERIAL				
TAG	QTY	VENDOR	PART NO	DESCRIPTION
XM30 - 2	1	TRANE	X13651537010	XM30, 4 POINT UI/AO EXPANSION MODULE

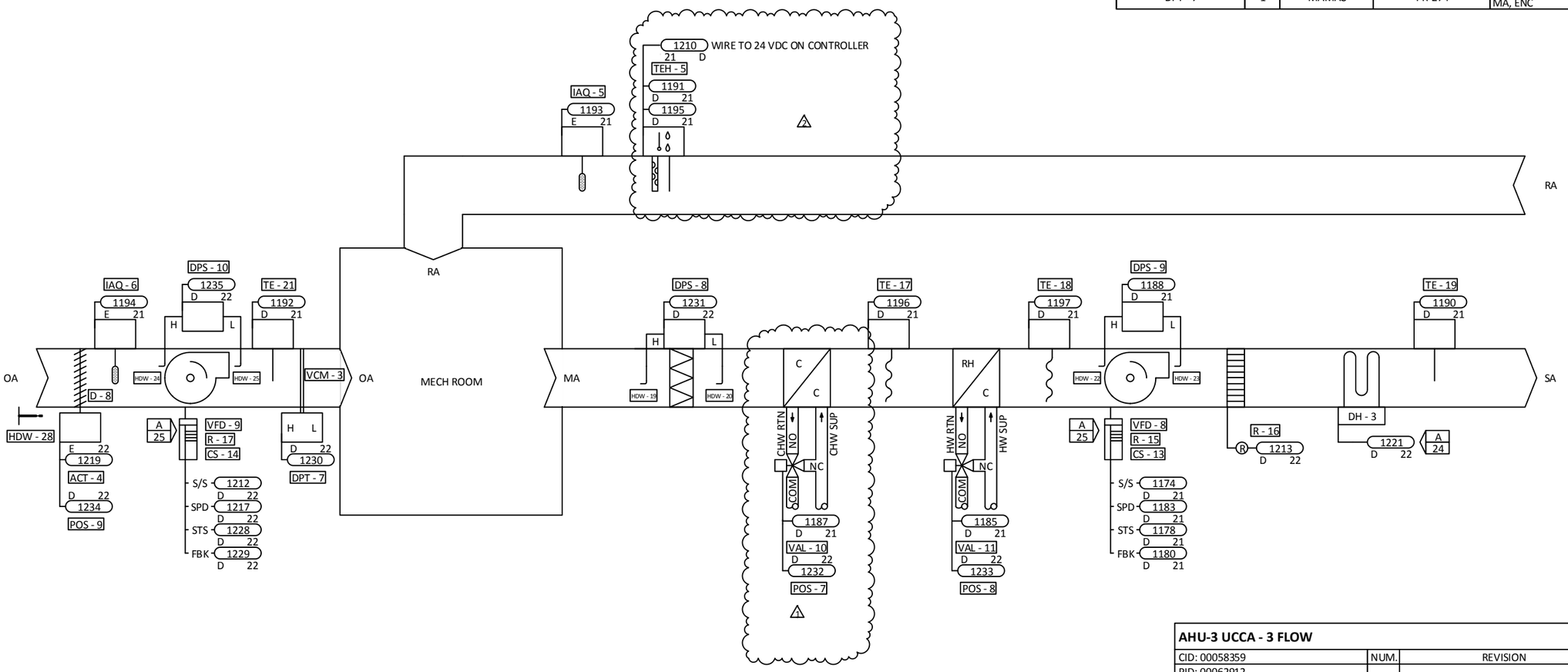


AHU- 2 XM30 - 2 CONTROLLER				
CID: 00058359	NUM.	REVISION	DATE:	BY:
PID: 00062912				
PROJECT: H434351				
SALESPERSON: R Urdanetta				
DESIGNED BY: J Ostrow				
CHECKED BY:				
Miramar 2884 Corporate Way MIRAMAR, FL 33025 954-499-6900	PROJECT: Miami Lakes Branch Library 6699 Windmill Gate Rd MIAMI LAKES FL 33014			
FILE: Miami Lakes Branch Library REV6.vsdx				DWG 19 OF 31



(AHU- 3)

BILL OF MATERIAL				
TAG	QTY	VENDOR	PART NO	DESCRIPTION
HDW - 28	1	TRANE	ROD00856	ANTI-SPIN ROD
IAQ - 9	1	TRANE	X13790422010	IAQ SENS, CO2, WALL
IAQ - 5, IAQ - 6	2	TRANE	X13790423010	IAQ SENS, CO2, DUCT
TEH - 8	1	TRANE	X1379044401	HUMIDITY SENS, ROOM, 3%, TEMP
VAL - 11	1	BELIMO	B317 + LRB24-SR	VAL, 3-WAY, CCV/BALL, 4.7 CV, 0.75 IN, SS, 600 PSI BODY + ACT, PROP, 24 VAC/VDC, NSR
VAL - 10	1	BELIMO	B323 + LRB24-SR	VAL, 3-WAY, CCV/BALL, 10 CV, 1 IN, SS, 600 PSI BODY + ACT, PROP, 24 VAC/VDC, NSR
ACT - 4	1	BELIMO	LMB24-SR	ACT, PROP, 24 VAC/VDC, 45 IN-LB, NSR
HDW - 19, HDW - 20, HDW - 22, HDW - 23, HDW - 24, HDW - 25	6	KELE	21122	STATIC PRESSURE TIP
TEH - 5	1	KELE	DP4A-D	DUCT DEW POINT AND DRY BULB TRANSMITTER
VCM - 3	1	KELE	FXP-XX	AIR FLOW SENSOR
DPS - 10, DPS - 8, DPS - 9	3	KELE	RFS-4001-031	DIFFERENTIAL PRESSURE SWITCH, 0.15 - 5.0 WC
R - 19	1	KELE	RIB2401B	RLY, SPDT 24/120 VAC/24 VDC, 20 A
R - 16, R - 17	2	KELE	RIBU1C	RLY, SPDT, LED, 10-30 VAC/DC/120 VAC, 10 A
CS - 13, CS - 14	2	KELE	RIBXGTA	CUR SW, 0.75-150A, SPLIT, NO
CS - 16	1	KELE	RIBXKTF	CUR SW, 0.25-150A, SOLID, NO
TE - 19, TE - 21	2	KELE	ST-D24-XH	TEMP SENS, DUCT/IMM, THERM, 9 IN, HB
TE - 17, TE - 18	2	KELE	ST-FZR24-36	RIGID AVERAGING THERMISTOR AND RTD SENSOR
DPT - 7	1	MAMAC	PR-274	STATIC PRESS XMTR, MULTIRANGE, 4-20 MA, ENC

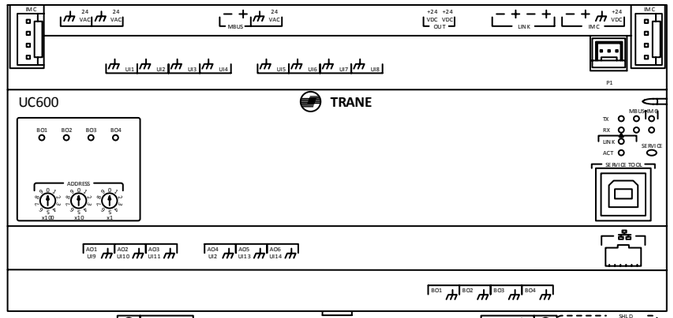


AHU-3 UCCA - 3 FLOW				
CID: 00058359	NUM.	REVISION	DATE:	BY:
PID: 00062912				
PROJECT: H434351	3	Changed space temp/humidity sensor	4/18/2018	JPO
SALESPERSON: R Urdanetta	2	Added Combo Dewpoint/Temp Sensor	3/26/2018	JPO
DESIGNED BY: J Ostrow	1	CHW Valves Are Now 3 Way	3/14/2018	JPO
CHECKED BY:	-	Original Submittal	3/1/2018	JPO
Miramar 2884 Corporate Way MIRAMAR, FL 33025 954-499-6900	PROJECT: Miami Lakes Branch Library 6699 Windmill Gate Rd MIAMI LAKES FL 33014			
FILE: Miami Lakes Branch Library REV6.vsdx			DWG 20 OF 31	

TRANE

(AHU- 3)

BILL OF MATERIAL				
TAG	QTY	VENDOR	PART NO	DESCRIPTION
UC600 - 3	1	TRANE	BMUC600AAA0100011	UC600 CONTROLLER, DIN RAIL MOUNT



UC600 - 3
SYSTEM CONTROLLED:
AHU- 3
LOCATION:
(ENC - 5)

VFD - 8 SUPPLY FAN VFD STATUS — 1178 D 20 — WHT / BLK (SHLD) — AO1/UI9
VFD - 8 SUPPLY FAN VFD FEEDBACK — 1180 D 20 — WHT / BLK (SHLD) — AO2/UI10
VFD - 8 SUPPLY FAN SPEED COMMAND — TB6 - 2 20 — WHT — AO3/UI11
VAL - 11 HEATING OUTPUT COMMAND — 1185 D 20 — WHT / BLK — AO4/UI12
VAL - 10 COOLING OUTPUT COMMAND — 1187 D 20 — WHT / BLK — AO5/UI13
DPS - 9 SUPPLY AIR FAN STATUS OPEN — 1188 D 20 — WHT / BLK (SHLD) — AO6/UI14
ETHERNET NETWORK
VFD - 8 SUPPLY FAN START STOP COMMAND — TB6 - 1 20 — WHT — BO1

BO2
BO3
BO4

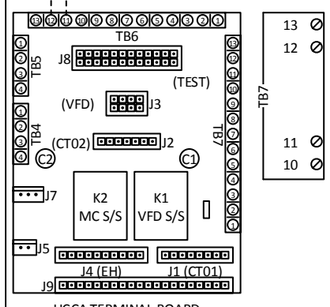
D 26
D 26
D 27

UI1 — BLK (SHLD) / WHT — 1190 D 20 — TE - 19 SUPPLY AIR TEMPERATURE
UI2 — BLK (SHLD) / WHT — 1191 D 20 — TEH - 5 TEMPERATURE AND DEWPOINT LOCAL TEMPERATURE
UI3 — BLK (SHLD) / WHT — 1192 D 20 — TE - 21 OUTSIDE AIR TEMPERATURE
UI4 — BLK (SHLD) / RED / WHT — 1193 E 20 — IAQ - 5 RETURN AIR CO2
UI5 — BLK (SHLD) / RED / WHT — 1194 E 20 — IAQ - 6 OUTSIDE AIR CO2
UI6 — BLK (SHLD) / WHT — 1195 D 20 — TEH - 5 TEMPERATURE AND DEWPOINT LOCAL HUMIDITY
UI7 — BLK (SHLD) / WHT — 1196 D 20 — TE - 17 COOLING COIL LEAVING TEMPERATURE
UI8 — BLK (SHLD) / WHT — 1197 D 20 — TE - 18 HEATING COIL LEAVING TEMPERATURE

B 28
C 27
B 28
F 26
F 26
C 27

PI1

GRN — GROUND — 1
XFRM 24 — BLK / WHT — 120 VAC BY EC — TX - 11
VAC 24
MBUS - / + / VAC 24
VDC +24 / +24 — WHT — 1210
LINK - / + — BLK / WHT — 2 A — [ON SC - 1 BACNET LINK 1]
LINK - / + — BLK / RED / WHT — TBT
BLK / BLK / WHT — 16 A — [TO XM70 - 3, XM30 - 3]
IMC - / + / VDC 24



UCCA TERMINAL BOARD

TB7: 13, 12, 11, 10

Remove Factory Power Connection Terminal J5. Will Use UC600 to Power UCCA Terminal Board.

1 DEVICE MUST BE GROUNDED WITH FACTORY PROVIDED GROUND WIRE AS DETAILED IN THE DEVICE INSTALLATION LITERATURE.

AHU-3 UCCA - 3 CONTROLLER

	NUM.	REVISION	DATE:	BY:
CID: 00058359				
PID: 00062912				
PROJECT: H434351				
SALESPERSON: R Urdanetta				
DESIGNED BY: J Ostrow				
CHECKED BY:	-	Original Submittal	3/1/2018	JPO

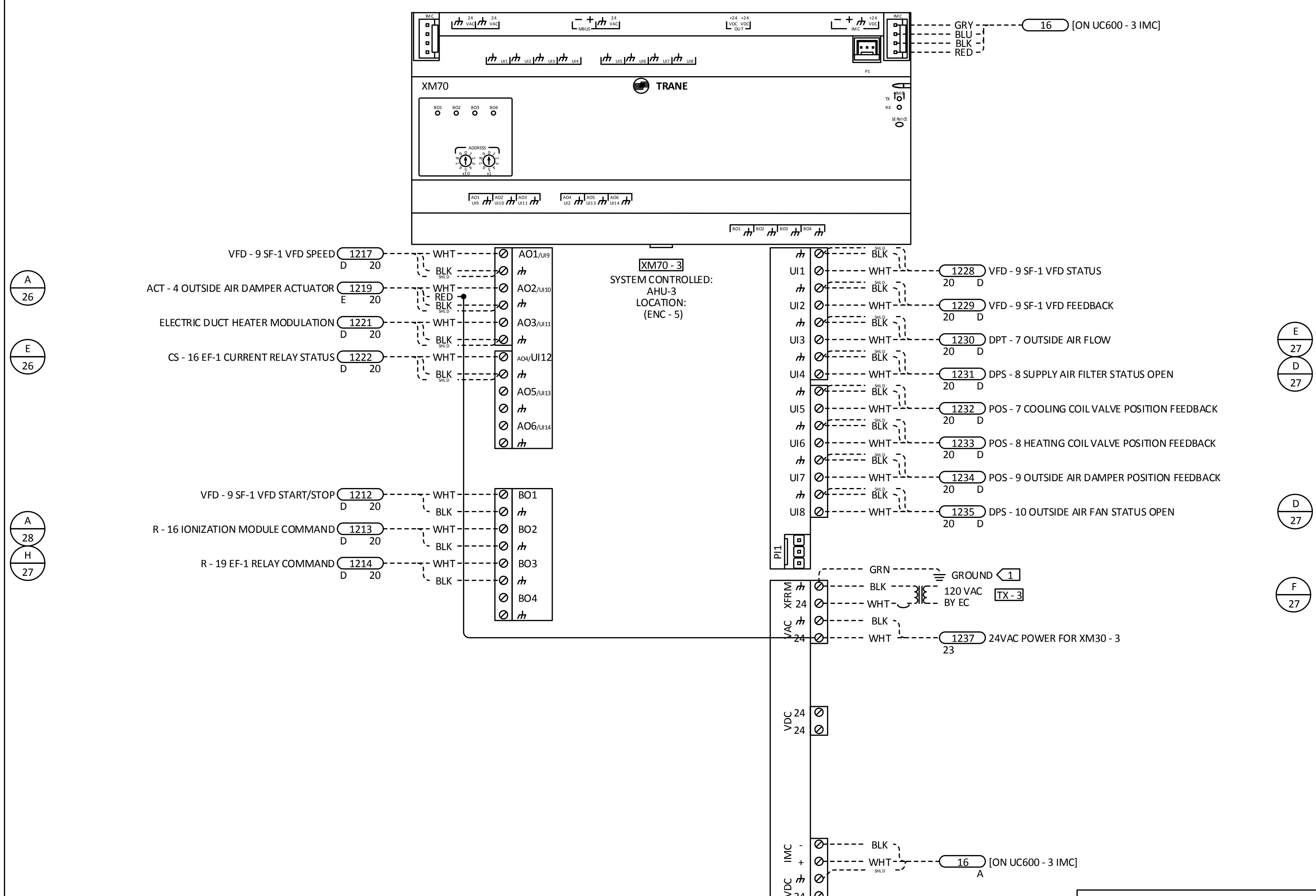
Miramar
2884 Corporate Way
MIRAMAR, FL 33025
954-499-6900

PROJECT: Miami Lakes Branch Library
6699 Windmill Gate Rd
MIAMI LAKES FL 33014

FILE: Miami Lakes Branch Library REV6.vsdx

(AHU-3)

BILL OF MATERIAL				
TAG	QTY	VENDOR	PART NO	DESCRIPTION
XM70 - 3	1	TRANE	X13651568010	XM70, 19 POINT EXPANSION MODULE
TX - 3	1	KELE	TR75VA002	XFMR, 120:24VAC, 75VA, CB



XM70
TRANE
GRY
BLU
BLK
RED
16
[ON UC600 - 3 IMC]
VFD - 9 SF-1 VFD SPEED
1217
D 20
ACT - 4 OUTSIDE AIR DAMPER ACTUATOR
1219
E 20
ELECTRIC DUCT HEATER MODULATION
1221
D 20
CS - 16 EF-1 CURRENT RELAY STATUS
1222
D 20
WHT
BLK
RED
AO1/UI9
AO2/UI10
AO3/UI11
AO4/UI12
AO5/UI13
AO6/UI14
XM70 - 3
SYSTEM CONTROLLED:
AHU-3
LOCATION:
(ENC - 5)
VFD - 9 SF-1 VFD START/STOP
1212
D 20
R - 16 IONIZATION MODULE COMMAND
1213
D 20
R - 19 EF-1 RELAY COMMAND
1214
D 20
BO1
BO2
BO3
BO4
UI1
UI2
UI3
UI4
UI5
UI6
UI7
UI8
1228
VFD - 9 SF-1 VFD STATUS
1229
VFD - 9 SF-1 VFD FEEDBACK
1230
DPT - 7 OUTSIDE AIR FLOW
1231
DPS - 8 SUPPLY AIR FILTER STATUS OPEN
1232
POS - 7 COOLING COIL VALVE POSITION FEEDBACK
1233
POS - 8 HEATING COIL VALVE POSITION FEEDBACK
1234
POS - 9 OUTSIDE AIR DAMPER POSITION FEEDBACK
1235
DPS - 10 OUTSIDE AIR FAN STATUS OPEN
20 D
PI1
GRN
GROUND
1
XFRM
24
VAC
24
120 VAC
BY EC
TX - 3
1237
24VAC POWER FOR XM30 - 3
23
VDC
24
24
IMC
-
+
VDC
24
16
[ON UC600 - 3 IMC]
A
A 26
E 26
A 28
H 27
E 27
D 27
D 27
F 27

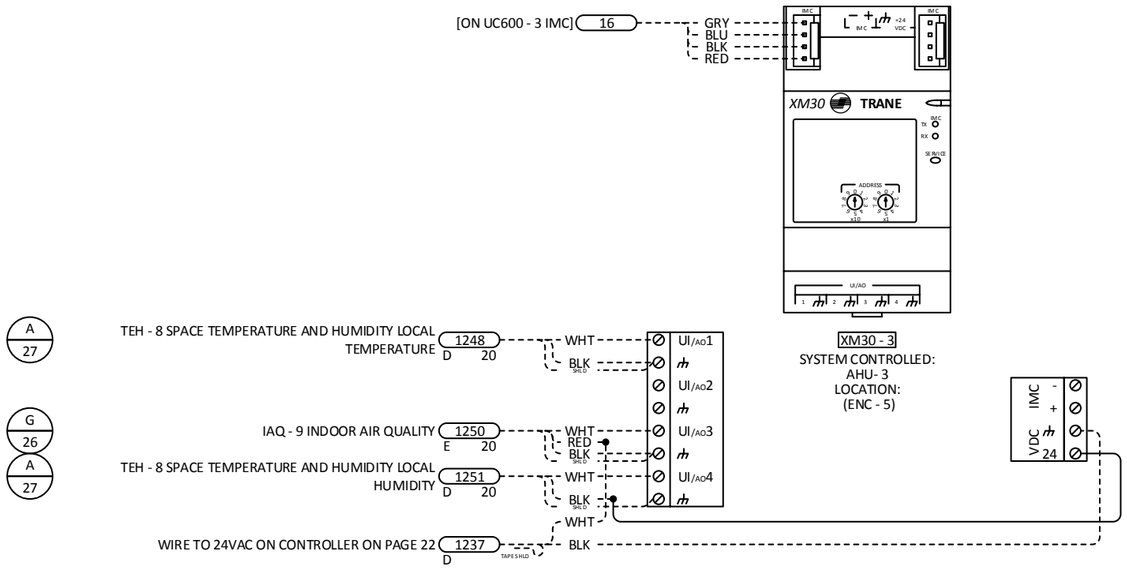
1 DEVICE MUST BE GROUNDED WITH FACTORY PROVIDED GROUND WIRE AS DETAILED IN THE DEVICE INSTALLATION LITERATURE.

AHU-3 XM70 - 3 CONTROLLER	NUM.	REVISION	DATE:	BY:
CID: 00058359				
PID: 00062912				
PROJECT: H434351				
SALESPERSON: R Urdanetta				
DESIGNED BY: J Ostrow				
CHECKED BY:	-	Original Submittal	3/1/2018	JPO

Miramar 2884 Corporate Way MIRAMAR, FL 33025 954-499-6900	PROJECT: Miami Lakes Branch Library 6699 Windmill Gate Rd MIAMI LAKES FL 33014
FILE: Miami Lakes Branch Library REV6.vsdx	DWG 22 OF 31

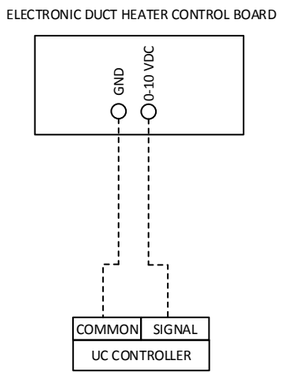
(AHU- 3)

BILL OF MATERIAL				
TAG	QTY	VENDOR	PART NO	DESCRIPTION
XM30 - 3	1	TRANE	X13651537010	XM30, 4 POINT UI/AO EXPANSION MODULE



AHU- 3 XM30 - 3 CONTROLLER				
CID: 00058359	NUM.	REVISION	DATE:	BY:
PID: 00062912				
PROJECT: H434351				
SALESPERSON: R Urdanetta				
DESIGNED BY: J Ostrow				
CHECKED BY:				
Miramar 2884 Corporate Way MIRAMAR, FL 33025 954-499-6900	PROJECT: Miami Lakes Branch Library 6699 Windmill Gate Rd MIAMI LAKES FL 33014			
FILE: Miami Lakes Branch Library REV6.vsdx				DWG 23 OF 31

GENERIC ELECTRONIC DUCT HEATER INTERFACE



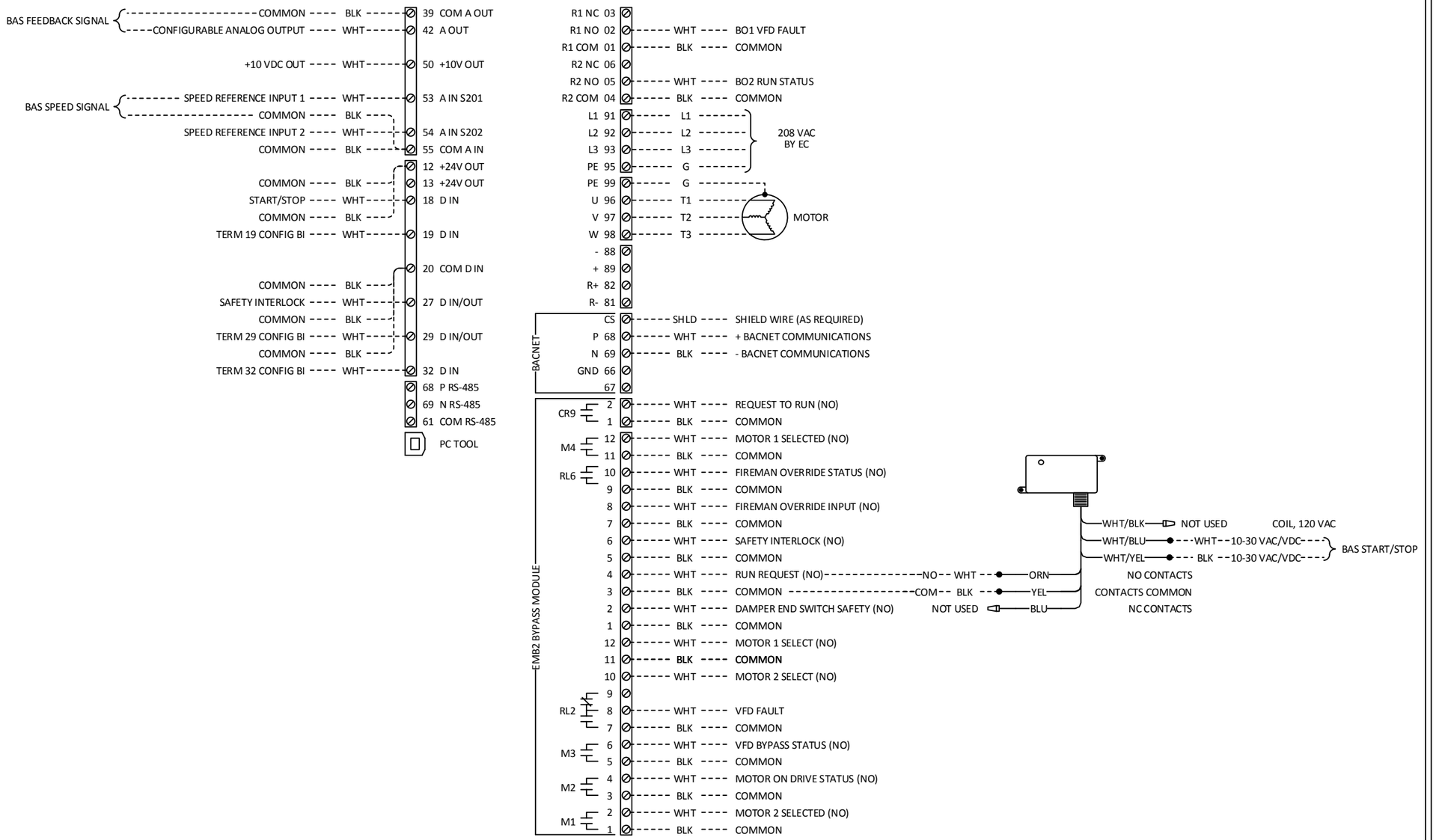
A

INTERCONNECT WIRING DETAIL

CID: 00058359	NUM.	REVISION	DATE:	BY:
PID: 00062912				
PROJECT: H434351				
SALESPERSON: R Urdanetta				
DESIGNED BY: J Ostrow				
CHECKED BY:				

Miramar 2884 Corporate Way MIRAMAR, FL 33025 954-499-6900	PROJECT: Miami Lakes Branch Library 6699 Windmill Gate Rd MIAMI LAKES FL 33014
FILE: Miami Lakes Branch Library REV6.vsdx	DWG 24 OF 31

TR200 VFD



A

INTERCONNECT WIRING DETAIL 2

CID: 00058359	NUM.	REVISION	DATE:	BY:
PID: 00062912				
PROJECT: H434351				
SALESPERSON: R Urdanetta				
DESIGNED BY: J Ostrow				
CHECKED BY:				

Miramar
2884 Corporate Way
MIRAMAR, FL 33025
954-499-6900

PROJECT: Miami Lakes Branch Library

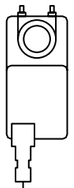
6699 Windmill Gate Rd
MIAMI LAKES FL 33014

FILE: Miami Lakes Branch Library REV6.vsdx

ACTUATORS MOD, 24VAC/DC, 45 IN-LB

BELIMO

LMB24-SR



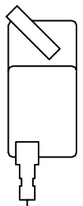
HOT (2) — RED — 24 VAC
COM (1) — BLK — COMMON
INPUT (3) — WHT — 2-10 VDC SIGNAL
OUTPUT (5) — GRN — FEEDBACK

A

VALVE ACTUATOR MOD, 24VAC/DC

BELIMO

ARB24-SR



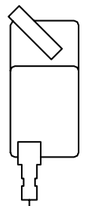
HOT (2) — RED — 24 VAC
COM (1) — BLK — COMMON
INPUT (3) — WHT — 2-10 VDC SIGNAL
OUTPUT (5) — GRN — FEEDBACK

B

VALVE ACTUATOR MOD, 24VAC/DC

BELIMO

ARB24-SR



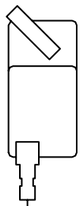
HOT (2) — RED — 24 VAC
COM (1) — BLK — COMMON
INPUT (3) — WHT — 2-10 VDC SIGNAL
OUTPUT (5) — NOT USED (CAP OFF)

C

VALVE ACTUATOR, MOD, 24VAC/DC

BELIMO

LRB24-SR



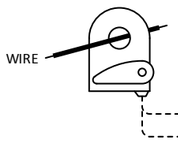
HOT (2) — RED — 24 VAC
COM (1) — BLK — COMMON
INPUT (3) — WHT — 2-10 VDC SIGNAL
OUTPUT (5) — GRN — FEEDBACK

D

CURRENT SWITCH

KELE

RIBXKTF



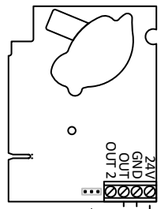
WHT — STATUS
BLK — COMMON

E

IAQ SENS, CO2, DUCT

TRANE

X13790423010



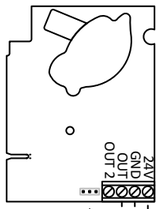
RED — 24 VAC
BLK — 24 VAC & SIGNAL COMMON
WHT — 0-10VDC SIGNAL
REMOVE OUT2 JUMPER

F

IAQ SENS, CO2, WALL

TRANE

X13790422010



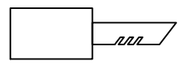
RED — 24 VAC
BLK — 24 VAC & SIGNAL COMMON
WHT — 0-10VDC SIGNAL
REMOVE OUT2 JUMPER

G

3% OA MOUNT HUMID. TRANS. 4-20MA W/TEMP

KELE

HO31K-T24



\+ — WHT — +24 VDC
\- — BLK — 4-20mA SIGNAL
T — RED — TEMPERATURE
T — GRN — COMMON

H

DETAIL SHEET

CID: 00058359	NUM.	REVISION	DATE:	BY:
PID: 00062912				
PROJECT: H434351				
SALESPERSON: R Urdanetta				
DESIGNED BY: J Ostrow				
CHECKED BY:	-	Original Submittal	3/1/2018	JPO

TRANE

Miramar
2884 Corporate Way
MIRAMAR, FL 33025
954-499-6900

PROJECT: Miami Lakes Branch Library

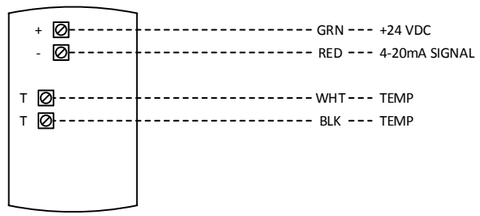
6699 Windmill Gate Rd
MIAMI LAKES FL 33014

FILE: Miami Lakes Branch Library REV6.vsdx

SENSOR ZONE RH +/- 3% AND TEMP

TRANE

X1379044401

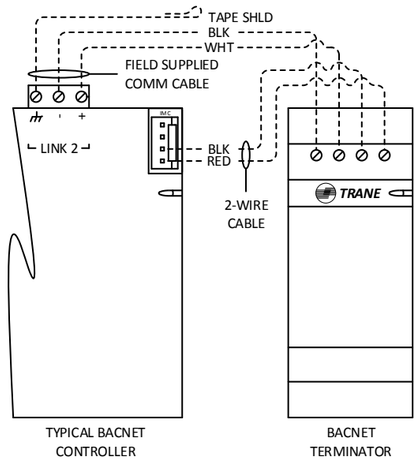


A

TRACER BACNET TERMINATOR (2/PKG)

TRANE

X13651524-01

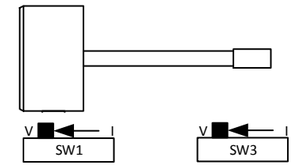


B

Duct Dew Point and Dry Bulb Transmitter

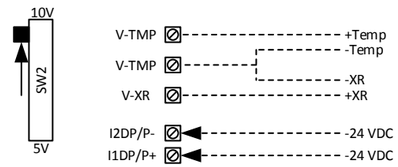
KELE

DP4A-D



SWITCH POSITIONS FOR VOLTAGE MODE

Switch Selectable 0-5 V or 0-10 V Output



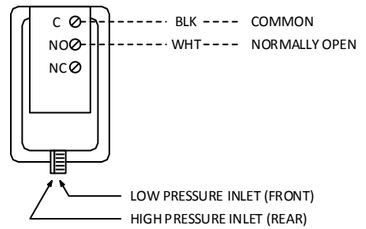
*XR Represents; DP – Dewpoint;
EN – Enthalpy; WB – Wet Bulb

C

DIFFERENTIAL PRESSURE SWITCH

KELE

RFS-4001-031

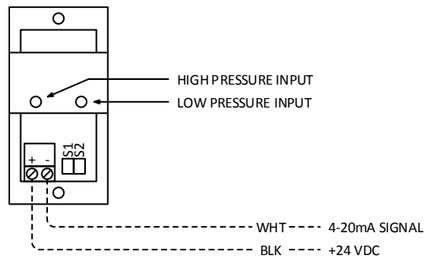


D

STATIC PRESSURE SENSOR

MAMAC

PR-274



TRANSDUCER CONFIGURATIONS (SET SWITCH AS SHOWN IN CIRCLED DIAGRAM)

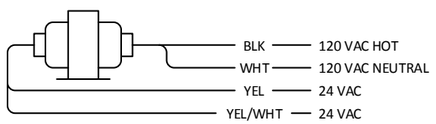
S2	S1		
UNI-DIRECTIONAL	0.0 TO 5.0" WC	0.0 TO 0.25" WC	0.0 TO 1.25" WC
BI-DIRECTIONAL	-2.5 TO +2.5" WC	-1.25 TO +1.25" WC	-.625 TO +.625" WC

E

TRANSFORMER, 120:24, 75VA, CKT BKR

KELE

TR75VA002

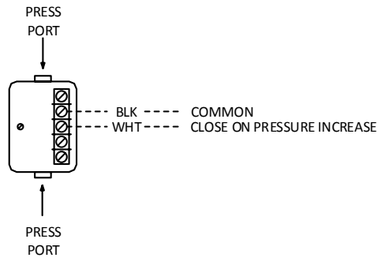


F

SWITCH WATER DP DELTA-PRO 4-45PSI

KELE

24-014

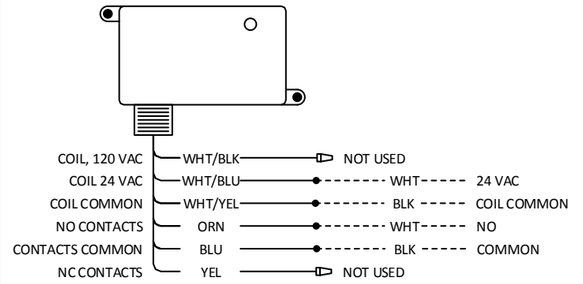


G

SPDT RELAY

KELE

RIB2401B



H

DETAIL SHEET 2

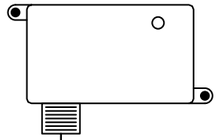
CID: 00058359	NUM.	REVISION	DATE:	BY:
PID: 00062912				
PROJECT: H434351				
SALESPERSON: R Urdanetta				
DESIGNED BY: J Ostrow				
CHECKED BY:	-	Original Submittal	3/1/2018	JPO

Miramar 2884 Corporate Way MIRAMAR, FL 33025 954-499-6900	PROJECT: Miami Lakes Branch Library 6699 Windmill Gate Rd MIAMI LAKES FL 33014
FILE: Miami Lakes Branch Library REV6.vsdx	DWG 27 OF 31

SPDT RELAY

KELE

RIBU1C



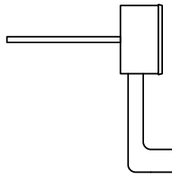
COIL, 120 VAC	WHT/BLK	NOT USED	
COIL 10-30 VAC/VDC	WHT/BLU	WHT	10-30 VAC/VDC
COIL COMMON	WHT/YEL	BLK	COIL COMMON
NO CONTACTS	ORN	WHT	NO
CONTACTS COMMON	YEL	BLK	COMMON
NC CONTACTS	BLU	NOT USED	

A

SENSOR TEMP DUCT 10K THERM, ENCL

KELE

ST-D24-XH



YEL	WHT	TEMPERATURE	
YEL	BLK	COMMON	

B

DETAIL SHEET 3

CID: 00058359	NUM.	REVISION	DATE:	BY:
PID: 00062912				
PROJECT: H434351				
SALESPERSON: R Urdanetta				
DESIGNED BY: J Ostrow				
CHECKED BY:				

Miramar 2884 Corporate Way MIRAMAR, FL 33025 954-499-6900	PROJECT: Miami Lakes Branch Library 6699 Windmill Gate Rd MIAMI LAKES FL 33014
FILE: Miami Lakes Branch Library REV6.vsdx	DWG 28 OF 31

ADDRESS SCHEDULE

ITEM	LINK TYPE	LINK	CONTROLLER	SYSTEM	TAG	LOCATION	AREA SERVED	GRP.	NET.	ADD.	WIRELESS SENSOR ADDRESS	IP ADDRESS	SUBNET MASK	GATEWAY	NOTE
1	BACnet	SC - 1 BACNET LINK 2	AHU-1	UC600 - 2						101					
2	BACnet	SC - 1 BACNET LINK 3	AHU-2	UC600 - 3						102					
3	BACnet	SC - 1 BACNET LINK 1	AHU-3	UC600 - 1						103					
4	BACnet	SC - 1 BACNET LINK 1	CHILLER PLANT	UC600 - 1						1					
5	BACnet	SC - 1 BACNET LINK 2	CHR-1	CHR - 2						2					
6	ETHERNET	ETHERNET	SC - 1	SC - 1						1					
7	IMC	UC600 - 1 IMC	CHU-1	XM70 - 1						1					
8	IMC	UC600 - 1 IMC	CHU-1	XM30 - 1											
9	IMC	UC600 - 2 IMC	CHU- 2	XM30 - 2											
10	IMC	UC600 - 2 IMC	CHU-2	XM70 - 2						1					
11	IMC	UC600 - 3 IMC	CHU- 3	XM30 - 3											
12	IMC	UC600 - 3 IMC	CHU-3	XM70 - 3						1					

TRANE

ADDRESS SCHEDULE				
CID: 00058359	NUM.	REVISION	DATE:	BY:
PID: 00062912				
PROJECT: H434351				
SALESPERSON: R Urdanetta				
DESIGNED BY: J Ostrow				
CHECKED BY:	-	Original Submittal	3/1/2018	JPO
Miramar 2884 Corporate Way MIRAMAR, FL 33025 954-499-6900	PROJECT: Miami Lakes Branch Library 6699 Windmill Gate Rd MIAMI LAKES FL 33014			
FILE: Miami Lakes Branch Library REV6.vsdx			DWG 29 OF 31	

ENCLOSURE SCHEDULE

TAG	LOCATION	PART NUMBER	DESCRIPTION	DIN RAIL	CONTROLLER	SYSTEM CONTROLLED
ENC - 1 (SC - 1)		**XTBASE559010**	**ENC, TRACER UC SINGLE, 120 VAC OUTLET**	**SINGLE**		
					SC - 1	SC - 1
					PM	for SC - 1
					TBT	BACNET LINK 1, TBT 1 of 2, for SC - 1
ENC - 2 (CHILLER PLANT)		**ONEBOX161608**	**ONEBOX UNIVERSAL ENCLOSURE 15.6 X 15.6 X 7.9, MULTI-RATED FOR NEMA 1, 2, 3, 3R, 3S AND 4**	**SINGLE**		
					UC600 - 1	CHILLER PLANT
					TBT	BACNET LINK 1, TBT 2 of 2, for SC - 1
ENC - 3 (AHU-1)		**XTBASE618010**	**ENC, TRACER UC, 120VAC**	**SUPERDOOR,**		
					UC600 - 1	AHU-1
				LOWER		
					XM70 - 1	AHU-1
ENC - 4 (AHU-2)		**XTBASE618010**	**ENC, TRACER UC, 120VAC**	**SUPERDOOR,**		
					UC600 - 2	AHU- 2
				LOWER		
					XM70 - 2	AHU-2
ENC - 5 (AHU-3)		**XTBASE618010**	**ENC, TRACER UC, 120VAC**	**SUPERDOOR,**		
					UC600 - 3	AHU- 3
				LOWER		
					XM70 - 3	AHU-3

ENCLOSURE SCHEDULE

CID: 00058359	NUM.	REVISION	DATE:	BY:
PID: 00062912				
PROJECT: H434351				
SALESPERSON: R Urdanetta				
DESIGNED BY: J Ostrow				
CHECKED BY:	-	Original Submittal	3/1/2018	JPO

Miramar
2884 Corporate Way
MIRAMAR, FL 33025
954-499-6900

PROJECT: Miami Lakes Branch Library

6699 Windmill Gate Rd
MIAMI LAKES FL 33014

FILE: Miami Lakes Branch Library REV6.vsdx

BILL OF MATERIAL				
TAG PREFIX	QTY	VENDOR	PART NO	DESCRIPTION
SFT	1	TRANE	BMCF000AAA0DB00	TRACER SC 15 LICENSE
SC	1	TRANE	BMSC000AAA011000	TRACER SC W/PM014
UC600	4	TRANE	BMUC600AAA0100011	UC600 CONTROLLER, DIN RAIL MOUNT
HDW	3	TRANE	ROD00856	ANTI-SPIN ROD
TBT	1	TRANE	X13651524-01	BACNET TERMINATOR (2 PACK)
XM30	3	TRANE	X13651537010	XM30, 4 POINT UI/AO EXPANSION MODULE
XM70	3	TRANE	X13651568010	XM70, 19 POINT EXPANSION MODULE
OD	1	TRANE	X13760351002	TRACER 10 IN OPERATOR COLOR DISPLAY, W/VESA MOUNT, 7 FT - ETH. CABLE.
IAQ	3	TRANE	X13790422010	IAQ SENS, CO2, WALL
IAQ	6	TRANE	X13790423010	IAQ SENS, CO2, DUCT
TEH	3	TRANE	X1379044401	HUMIDITY SENS, ROOM, 3%, TEMP
VAL	3	BELIMO	B317 + LRB24-SR	VAL, 3-WAY, CCV/BALL, 4.7 CV, 0.75 IN, SS, 600 PSI BODY + ACT, PROP, 24 VAC/VDC, NSR
VAL	1	BELIMO	B323 + LRB24-SR	VAL, 3-WAY, CCV/BALL, 10 CV, 1 IN, SS, 600 PSI BODY + ACT, PROP, 24 VAC/VDC, NSR
VAL	3	BELIMO	B330 + ARB24-SR	VAL, 3-WAY, CCV/BALL, 19 CV, 1.25 IN, SS, 600 PSI BODY + ACT, PROP, 24 VAC/VDC, NSR
ACT	3	BELIMO	LMB24-SR	ACT, PROP, 24 VAC/VDC, 45 IN-LB, NSR
HDW	18	KELE	21122	STATIC PRESSURE TIP
DPS	1	KELE	24-014	DIFF PRESS SW WTR, 4 PSIG - 43.5 PSIG, SPDT, 0.25 FPT
TEH	3	KELE	DP4A-D	DUCT DEW POINT AND DRY BULB TRANSMITTER
VCM	3	KELE	FXP-XX	AIR FLOW SENSOR
TEH	1	KELE	HO31K-T24	HUMIDITY SENS, OA, 3%, TEMP
DPS	9	KELE	RFS-4001-031	DIFFERENTIAL PRESSURE SWITCH, 0.15 - 5.0 WC
R	3	KELE	RIB2401B	RLY, SPDT 24/120 VAC/24 VDC, 20 A
R	7	KELE	RIBU1C	RLY, SPDT, LED, 10-30 VAC/DC/120 VAC, 10 A
CS	7	KELE	RIBXGTA	CUR SW, 0.75-150A, SPLIT, NO
CS	3	KELE	RIBXKTF	CUR SW, 0.25-150A, SOLID, NO
TE	6	KELE	ST-D24-XH	TEMP SENS, DUCT/IMM, THERM, 9 IN, HB
TE	6	KELE	ST-FZR24-36	RIGID AVERAGING THERMISTOR AND RTD SENSOR
TX	4	KELE	TR75VA002	XFMR, 120:24VAC, 75VA, CB
DPT	3	MAMAC	PR-274	STATIC PRESS XMTR, MULTIRANGE, 4-20 MA, ENC
ENCLOSURES	5	*	*	*SEE ENCLOSURE SCHEDULE

BILL OF MATERIALS

CID: 00058359	NUM.	REVISION	DATE:	BY:
PID: 00062912				
PROJECT: H434351				
SALESPERSON: R Urdanetta				
DESIGNED BY: J Ostrow				
CHECKED BY:	-	Original Submittal	3/1/2018	JPO

Miramar
2884 Corporate Way
MIRAMAR, FL 33025
954-499-6900

PROJECT: Miami Lakes Branch Library

6699 Windmill Gate Rd
MIAMI LAKES FL 33014

Datasheet Index

The following is a list of datasheets included in this submittal in the order that they appear.

Installation Instructions

Tracer® 10-inch Display

Order Numbers:
X13760351002 (MOD02819) Concierge Display (10" display)

⚠ SAFETY WARNING

Only qualified personnel should install and service the equipment. The installation, starting up, and servicing of heating, ventilating, and air-conditioning equipment can be hazardous and requires specific knowledge and training. Improperly installed, adjusted or altered equipment by an unqualified person could result in death or serious injury. When working on the equipment, observe all precautions in the literature and on the tags, stickers, and labels that are attached to the equipment.

March 2017 **X39641308001B**

1

Warnings, Cautions, and Notices

Read this manual thoroughly before operating or servicing this unit. Safety advisories appear throughout this manual as required. Your personal safety and the proper operation of this machine depend upon the strict observance of these precautions.

The three types of advisories are defined as follows:

⚠ WARNING Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

⚠ CAUTION Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury. It could also be used to alert against unsafe

NOTICE Indicates a situation that could result in equipment or property-damage only accidents.

⚠ WARNING

Proper Field Wiring and Grounding Required!
Failure to follow code could result in death or serious injury. All field wiring MUST be performed by qualified personnel. Improperly installed and grounded field wiring poses FIRE and ELECTROCUTION hazards. To avoid these hazards, you MUST follow requirements for field wiring installation and grounding as described in NEC and your local/state electrical codes.

⚠ WARNING

Personal Protective Equipment Required!
Installing/servicing this unit could result in exposure to electrical, mechanical and chemical hazards. Before installing/servicing this unit, technicians MUST put on all Personal Protective Equipment (PPE) recommended for the work being undertaken. ALWAYS refer to appropriate MSDS sheets and OSHA guidelines for proper PPE. When working with or around hazardous chemicals, ALWAYS refer to the appropriate MSDS sheets and OSHA guidelines for information on allowable personal exposure levels, proper respiratory protection and handling recommendations. If there is a risk of arc or flash, technicians MUST put on all necessary Personal Protective Equipment (PPE) in accordance with NFPA70E for arc/flash protection PRIOR to servicing the unit. Failure to follow recommendations could result in death or serious injury.

2

⚠ WARNING

Follow EHS Policies!
Failure to follow instructions below could result in death or serious injury.
- **All Ingersoll Rand personnel must follow Ingersoll Rand Environmental, Health and Safety (EHS) policies when performing work such as hot work, electrical, fall protection, lockout/tagout, refrigerant handling, etc. All policies can be found on the BOS site. Where local regulations are more stringent than these policies, those regulations supersede these policies.**
- **Non-Ingersoll Rand personnel should always follow local regulations.**

Verify Package Contents

Table 1. Packaged contents

Item	Quantity
10.1-inch Display	1
Display power cord	1
Installation Instructions	1
User Guide	1
VESA Mounting Bracket	1
Ethernet Cable	1

Note: *Tracer 10-inch display is designed for use with Tracer Concierge and Tracer SC.*

3

Mounting the Display

Note: *The display is designed for conditioned indoor environments only.*

Note: *The display can be connected to Concierge Controller or Tracer SC:*

- Directly by Ethernet cable
- By the optional Wi-Fi router
- On the customer network

Important: *If using the Trane Wi-Fi router, the display must be powered up after the Concierge Controller or Tracer SC and router to ensure the router uses the correct default addresses for Concierge Controller or Tracer SC and the display.*

The display mounts to the wall using a VESA mount. The required VESA mounting bracket size is 75 mm x 75 mm. A VESA mount (Order Number X05010511010) is shipped with the display, but any standard VESA mount should be acceptable. Bend, tilt, swivel and any other features are acceptable.

1. Select the wall space to mount the display. Mounting constraints are as follows:
   - The display must be powered continuously so mount it near an electrical outlet.
   - The display communicates to the Concierge Controller or Tracer SC using either Wi-Fi or Ethernet cable connection. Use standard Wi-Fi guidelines to select the display location.
   - The display should be accessible for any users that are allowed to make adjustments using the display.
2. Disassemble the VESA mount.
3. Install the wall section onto the wall.
4. Install the display section of the VESA mount onto the display enclosure using the 4 screws included with the VESA mount.
5. Re-assemble the VESA mount so the display is now on the wall.

4

Powering the Display

1. Connect the Ethernet cable from the Concierge Controller or Tracer SC Port 2 to the display Ethernet Port. Or alternatively for a WiFi connection, connect the Ethernet cable from Tracer SC Port 2 to the WiFi router Port 1.
2. Plug in the display power adapter to an appropriate wall outlet.
3. If the display does not power up, then press the power switch on the back of the display.

Figure 1. Back of the Display

Display Setup

This section describes how to setup your 10-inch display.

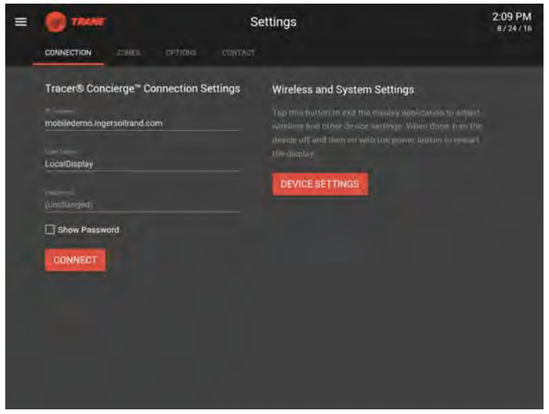
Important: *If using the Trane WiFi router, the 10-inch display must be powered up after the Concierge Controller or Tracer SC and router to ensure the router uses the correct default addresses for Concierge Controller or Tracer SC and the display. Alternatively, the display may be hardwired to the Concierge Controller or Tracer SC .*

5

Configuring the Display

1. Select the **Connection** tab.

Figure 2. Connection Tab



2. Tap **Device Settings**.
3. If connecting to Concierge Controller or Tracer SC SC via the wireless network:
   a. Choose **Wi-Fi** and wait for the display to refresh available Wi-Fi networks.
   b. If using the Wi-Fi router from Trane, select **ciscosb1** and verify security is **WPA2 PSK**.
   c. Enter the Wi-Fi password: **Simple#Retail**.
   d. Verify that the display is connected to ciscosb.

6

Note: *If there are problems connecting, forget the network and start over.*

4. If connecting to Concierge Controller or Tracer SC directly via an Ethernet cable:
   a. Choose **More** | **Ethernet**.
   b. Select **Use static IP** and set the following:
      - IP Address: 192.168.2.11 Note: This address will work when the display is connected to Concierge Controller or Tracer SC Port 2, which defaults to 192.168.2.10.
      - Gateway: 192.168.2.10 (Tracer SC Port 2 address)
      - Netmask: 255.255.255.0
      - DNS 1: 192.168.2.10 (Tracer SC Port 2 address)
      - DNS 2: (blank)

Note: *Wi-Fi must be disabled to use a wired Ethernet connection between the 10-inch display and Concierge Controller or Tracer SC.*

5. To exit the Device Settings screen, use the Back button located on the back of the display near the power button to return to the Connections tab.
6. Enter the **IP Address** of Concierge Controller or Tracer SC. It defaults to Port 2. By default, the controller's default address 192.168.2.10 on Port 2 displays. Hostname may be used in place of the IP address. However, it must be a fully qualified hostname.

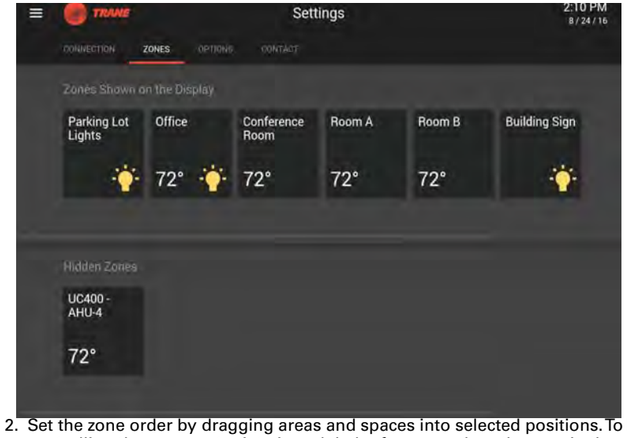
Note: *Do not add a port in the IP address field. The display will attempt a secure connection (via https) first. If not available, it will establish a standard connection (http).*

7. Enter the **User Name** and **Password** of the user you previously setup.
8. Click **Connect**.

Zones

1. Select the **Zones** tab.

Figure 3. Show, Hide, and Order Zones

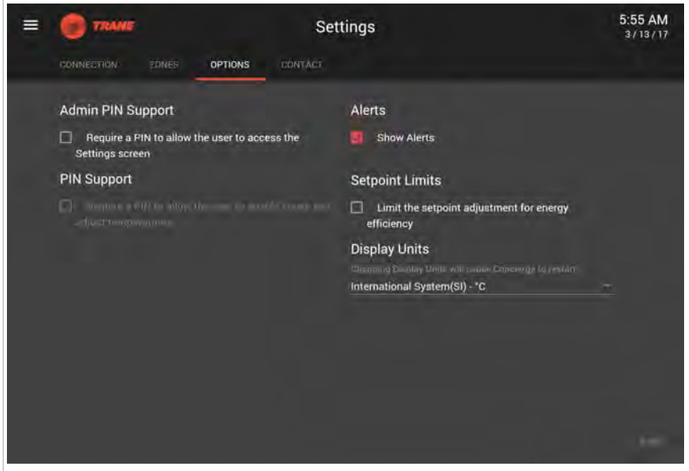


2. Set the zone order by dragging areas and spaces into selected positions. To hide a zone from the display, drag it to the bottom row.If an area is controlling the space setpoint via a global referencer, place the area in the upper row and the space in the bottom row to hide it.

Options

1. Select the **Options** tab.
2. If desired, enable **Admin PIN Support**. Admin PIN requires users to enter the Admin PIN to view or modify Concierge Controller or Tracer SC connection settings, Zone configuration, display options, and contact information. PIN support prevents non-authorized users (new employees or the general public) from changing a setting on the 10-inch display.
3. Tap **Show Alerts** to enable alerting.

Figure 4. Options



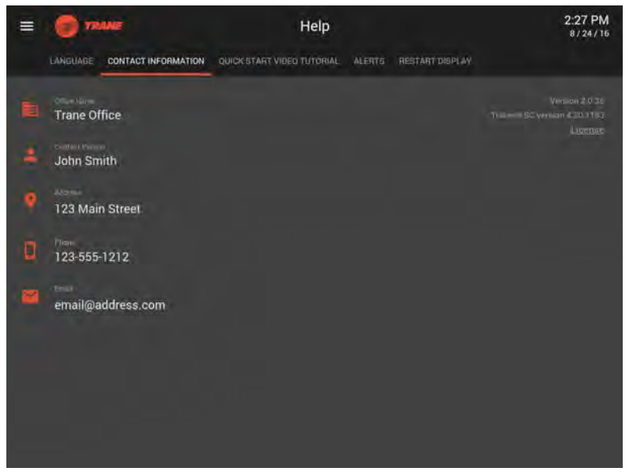
4. Setpoint limit defaults to +/-3 degrees. From the Options tab, you can change the setpoint limit from 1-9 or disable it entirely.
5. If desired, change the **Display Units**. If you adjust this setting, the display will restart.

Note: *This setpoint limit applies to the setpoints on the main screen and will not apply to any custom graphics.*

Contact

1. Select the **Contact** tab, enter contact information for the person who supports 10-inch display.

Figure 5. Contact Information



Troubleshooting and Common Questions

Problem	Explanation / Resolution
Communication loss	If communication loss occurs between the Concierge Controller or Tracer SC and the display, or between the Concierge Controller or Tracer SC and the unit controllers, some elements of the screen may disappear temporarily and/or the display may restart. When this occurs, in addition to troubleshooting the communication loss, press the power button to restart the display.
Changes to site via the web interface Display Restarts	If the Concierge Controller or Tracer SC programming changes (such as schedules added, zones renamed, or graphics loaded), after the display has been started, the display should reflect the changes after a few minutes and may restart. If the display does not update in a timely manner, restart the display by pressing the power button on the back of the display.
Up or down arrow are disabled	Potential causes: • Setpoint is controlled locally at the zone sensor (such as thumbwheel). • The user does not have access to the setpoint. • The setpoint is controlled at a higher priority than Tracer Concierge. • The setpoint is out of the range of the limits. The range is applied to the relinquish default value of the setpoint.

Ingersoll Rand

Ingersoll Rand (NYSE:IR) advances the quality of life by creating comfortable, sustainable and efficient environments. Our people and our family of brands—including Club Car®, Ingersoll Rand®, Thermo King® and Trane®—work together to enhance the quality and comfort of air in homes and buildings; transport and protect food and perishables; and increase industrial productivity and efficiency. We are a global business committed to a world of sustainable progress and enduring results.

Club Car · Ingersoll Rand · THERMO KING · TRANE

ingersollrand.com

X39641308001B 13 Mar 2017
(NEW)

Product Data Sheet

Tracer® SC System Controller

Ordering number: BMSC000AAA011000

The Tracer® SC building automation system is a complete building control solution that delivers high performance and efficiency, along with the reliability you would expect from Trane. Tracer SC coordinates equipment from your building's HVAC, lighting, and other systems and offers control with a simplified, web-enabled user interface so you get easy and convenient access to your systems from virtually anywhere.

Features and Benefits

Feature	Benefit
Occupant comfort and energy savings	• Tracer SC includes several factory engineered HVAC applications that have been developed by HVAC system experts and tested on tens of thousands of facilities to ensure that your facility operates at its peak performance. These applications provide consistent comfort and improved indoor air quality, while reducing energy requirements. • For any building owner concerned with energy, indoor air quality, and the environment, Trane EarthWise™ Systems represent a design philosophy whose time has come. EarthWise Systems provide documented sustainability of high efficiency and low emissions over the entire lifetime of the building.
Access your facility from anywhere	• Tracer SC is web-enabled and accessible from virtually any device with a web browser. All of the most popular device types, operating systems, and browsers are supported. • The Tracer BAS Operator Suite is a mobile app that allows you to monitor and manage buildings from virtually anywhere, giving you greater freedom and constant peace of mind. • Trane Connect Remote Access provides an easy, secure option to connect remotely to a Tracer SC.
Support for open, standard protocols	• Open, standard protocols are the key to enabling communication among Trane and non-Trane HVAC equipment, as well as other complementary facility systems. These protocols enable communication across systems and vendors to ensure that your building operates at its best on day one and beyond. • Tracer SC natively communicates with BACnet®, Modbus, and LonTalk controllers and is listed as a BACnet Building Controller (B-BC) by BACnet Test Labs (BTL).
Support for Trane® Air-Fi™ wireless	• Trane Air-Fi Wireless brings maximum flexibility to a building automation system. Trane technology helps prepare your facilities for the future of building information. Trane Air-Fi Wireless runs BACnet protocol over ZigBee building automation standards. Trane Air-Fi is the first HVAC manufacturer to be Zigbee Certified.
Easy to use	• The Tracer SC user interface provides an easy way for building operators to set up, operate, and modify a building automation system.

⚠SAFETY WARNING

Only qualified personnel should install and service the equipment. The installation, starting up, and servicing of heating, ventilating, and air-conditioning equipment can be hazardous and requires specific knowledge and training. Improperly installed, adjusted or altered equipment by an unqualified person could result in death or serious injury. When working on the equipment, observe all precautions in the literature and on the tags, stickers, and labels that are attached to the equipment.

Tracer SC Facilities

A Tracer SC facility is defined as one Application Tracer SC and one or more associated Base Tracer SCs. A single building or site can contain more than one facility. See the following table for device capability.

Device Capability

Communication Type	Single SC	Multi SC
Air-Fi™ Wireless	Up to 120 devices	Up to 240 devices
BACnet/MSTP	Up to 120 devices	Up to 240 devices
BACnet/IP	Up to 240 devices	Up to 240 devices
COMM 3/4	Up to 240 devices	Up to 240 devices
LON	Up to 120 devices	N/A
Modbus TCP	Up to 240 devices	N/A
Modbus RTU	Up to 60 devices	N/A

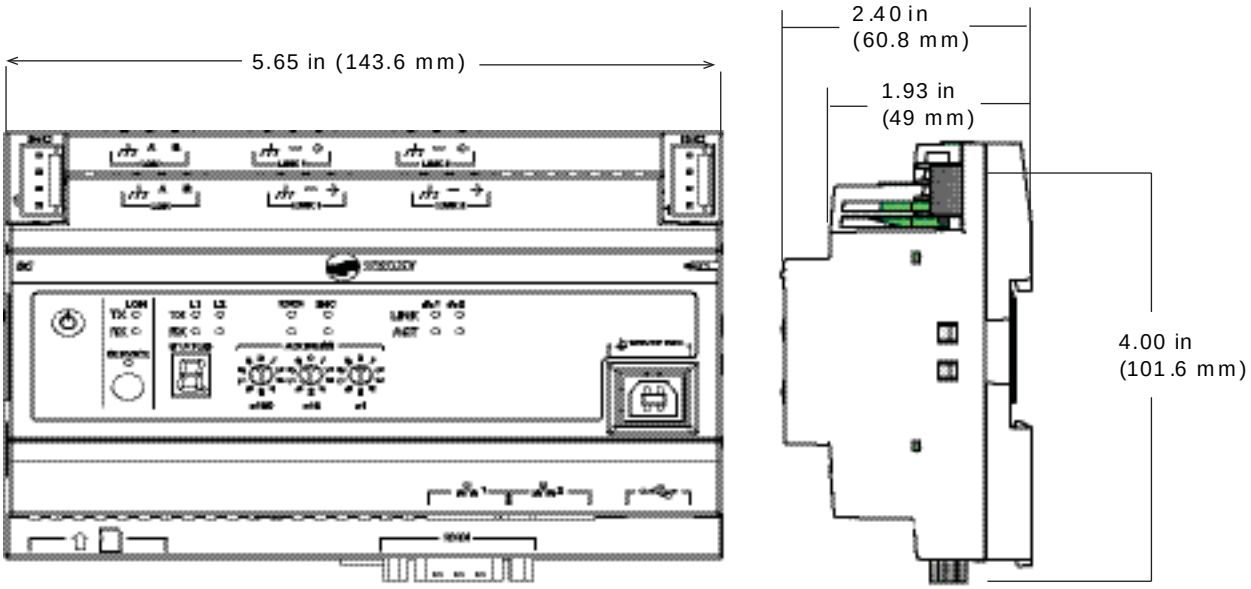
Controller Specifications

Client Software Requirements	
PC or Mac	Microsoft® Windows 7: • Internet Explorer™ version 11 • Mozilla Firefox® — most recent version • Google Chrome™ — most recent version Microsoft® Windows 10: • Internet Explore - no support • Microsoft Edge™ - latest version • Mozilla Firefox® — most recent version • Google Chrome™ — most recent version Apple® Mac OS 10.9/10.10: • Mozilla Firefox® — latest version • Google Chrome™ — latest verison • Safari® — latest version
Tablet/Phone	iOS (iPad®/iPhone®) — 8, 9: • Safari — most recent version Android — 4.4+ • Google Chrome — version 45 or higher Microsoft® Windows 10: • Microsoft Edge™ - latest version
Tracer SC System Controller	
Concurrent Users	• Five
Supported Languages	Up to four languages are supported per Tracer SC. • English • Chinese (Simplified/Traditional) • French • French Canadian • Portuguese (Brazil) • German • Indonesian • Japanese • Korean • Spanish (Latin America) • Thai • Polish • Arabic
Power requirements	From PM014 Power Supply: 24 Vdc @ 0.3A; 14VA max (PM014 input VA)
Operating environment	• Temperature: From –40°F to 122°F (–40°C to 50°C) • Relative humidity: From 10% to 90%, non-condensing
Storage environment	• Temperature: From –40°F to 158°F (–40°C to 70°C) • Relative humidity: From 5% to 95%, non-condensing

Agency Listings	UL: • UL-864/UUKL listed (when installed and programmed in accordance with the Engineered Smoke Control System Application Guide, BAS-APG019-EN) • UL-916-PAZX – energy management • CUL-C22.2-signal devices – Canada FCC: • FCC part 15, Class A CE CE: • The European Union (EU) Declaration of Conformity is available from your local Trane® office. ISO: • 9001:2008
Processor	PowerPC405 Core
Memory	• FLASH 400 MB • SDRAM 256 MB
Battery	• No battery required. The clock is maintained for a minimum of three days by the super capacitor. All other programs are backed up by nonvolatile memory.
BACnet	Tracer building automation systems communicates with BACnet devices that support: • Communications based on the BACnet ASHRAE/ANSI 2012 standard • ENV-1805-1/ENV-13321-1 • 10BASE-T/100BASE-TX dedicated Ethernet (ISO/IEC 8802-3) or Transmission Control Protocol/Internet Protocol (TCP/IP) compatible network Tracer SC is listed by BACnet Test Labs (BTL) as a BACnet Building Controller (B-BC). Listing information can be found at: http://www.bacnetinternational.net
LonTalk	Tracer building automation systems communicates with LonTalk devices that support: • Communications based on the EIA-709.1 (LonTalk) standard • LonTalk standard network variable types (SNVTs) • FTT-10A or FT-X1 transceivers • Twisted-pair physical media (Level 4 wiring)
Modbus	• Communications based on Modbus RTU defacto standard over EIA/TIA 485 (2-wire) • Communications based on Modbus TCP defacto standard over 10BASE-T/100BASE-TX Transmission Control Protocol/Internet Protocol (TCP/IP) compatible network
Protocol Communication	
Device Limits	Tracer SC facility (Combination of all protocols) • Up to 240 devices **(Per link/Per facility)** • Tracer UC200 Series - 60/240 • Tracer UC400 Series - 60/240 • Tracer UC600 Series- 10/20 • Tracer UC800 Series - 60/240 • BCI Series - 60/240 • Trane Communicating Thermostats - 60/120 • Non-Trane BACnet - 32/240 • AH Series - 120/120 • CH Series - 120/120 • VV Series - 120/120 • ZN Series - 120/120 • MP503 - 120/120 • MP580 - 20/20 • Modbus TCP - 240/NA • Modbus RTU - 60/NA • Trane Communicating Thermostats - 120/120 • Non-Trane LON - 120/120 Air-Fi Wireless (Per network/per facility) • WCI - 30/240
Medium Enclosure (optional)	
NEMA Type	NEMA-1
Weight	14 lb. (6.5 kg)
Mounting	Wall-mounted with #10 (5 mm) screws and #10 wall anchors. Mounting surface must be able to support 60 lb. (28 kg)
Large Enclosure (optional)	
NEMA Type	NEMA-1

Weight	50 lb.(23.0 kg)
Mounting	Wall-mounted with #10 (5 mm) screws and #10 wall anchors. Mounting surface must be able to support 120 lb. (56 kg)

Tracer SC Dimensions



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BAS-PRD024G-EN 11 Aug 2017
Supersedes BAS-PRD024F-EN (26 Jun 2017)

Installation Instructions

Tracer™ BACnet® Terminator

Ordering Number: X13651524-01

Packaged Contents

- Two (2) Tracer BACnet terminators
- Two (2) wire cables with power connectors
- One (1) copy of the installation instructions

⚠ SAFETY WARNING

Only qualified personnel should install and service the equipment. The installation, starting up, and servicing of heating, ventilating, and air-conditioning equipment can be hazardous and requires specific knowledge and training. Improperly installed, adjusted or altered equipment by an unqualified person could result in death or serious injury. When working on the equipment, observe all precautions in the literature and on the tags, stickers, and labels that are attached to the equipment.

July 2011

X39641151-01D

1

BACnet Wiring Guidelines

Observe the following:

- Use 18 AWG, 24 pF/ft, communication wire (Trane purple wire).
- BACnet wiring must use daisy-chain configuration.
- Maximum length is 4,000 ft (1219 m).
- Maintain polarity across the BACnet communication link.
- Limit each link to 60 controllers or 120 total controllers per Tracer SC.
- All Tracer SC BACnet links must be properly terminated; use a BACnet terminator at each end of the link.

Note: *Trane devices operate on BACnet MS/TP (Master Slave/Token Passing) communication links. MS/TP is a type of local area network. It is wired using shielded twisted pair wire.*

BACnet Link Configuration and Power Wiring

The Tracer BACnet terminator is a powered device that must be connected to either 24 Vac or 24 Vdc power.

Figure 1 on panel 2, illustrates valid daisy-chain configurations and Tracer BACnet terminator locations.

Figure 2 on panel 3 illustrates the most common application, which is connecting to the IMC bus to power the module. Wire cables are supplied for this application.

Note: *Refer to the label on the Tracer BACnet terminator for power requirements when connecting the Tracer BACnet terminator to non-Trane devices.*

2

Communication Wiring

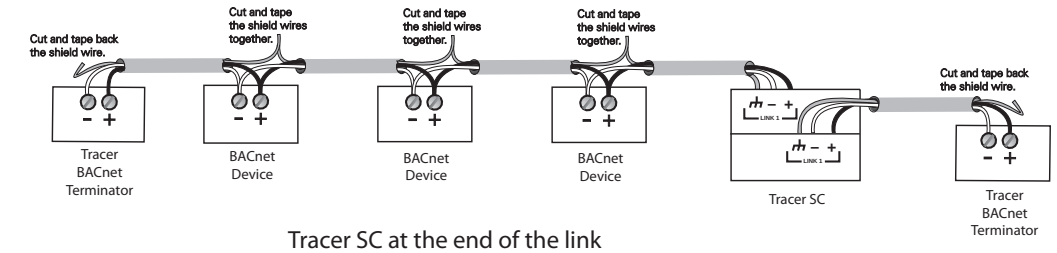
Follow these guidelines when installing communication wiring:

- The communication wire shield must be connected to the ground terminal of the link termination block at the Tracer SC. The Tracer SC provides the ground for the BACnet link.
- It is best practice to tape back the shield conductor at the terminator and each end of the link as illustrated in Figure 1.

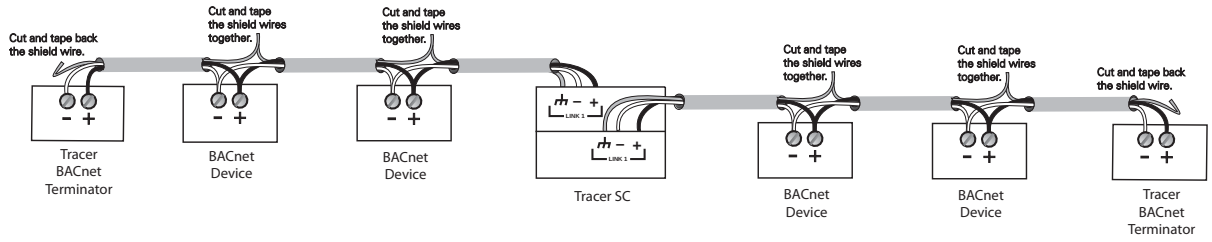
Important: *Never connect the shield conductor to ground at the Tracer BACnet terminator.*

- Tie shield conductors together and tape back at each BACnet device between the Tracer SC and the BACnet terminator.
- BACnet communication wiring can be terminated on LINK 1 or LINK 2 on the Tracer SC.

Figure 1. Communication link configurations for Tracer SC and Tracer BACnet terminator



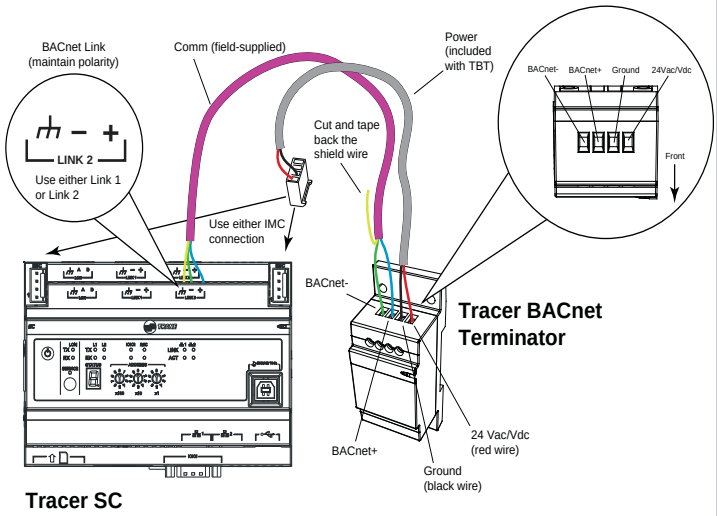
Tracer SC at the end of the link



Tracer SC in the middle of the link

3

Figure 2. Tracer BACnet terminator connected to a Tracer SC



Note: *If an IMC terminal is not available when connecting to a BACnet device, it may be necessary to install a 24 Vac power supply or run power from another 24 Vac or 24 Vdc source.*

4

Installation Options

The Tracer BACnet terminator can be installed onto a DIN rail or directly inside of an enclosure.

Option 1: Install the Tracer BACnet terminator onto a DIN rail

NOTICE
Avoid Equipment Damage! Do not use excessive force to install the Tracer BACnet terminator onto a DIN rail. Excessive force could result in damage to the plastic enclosure.

To install the device:

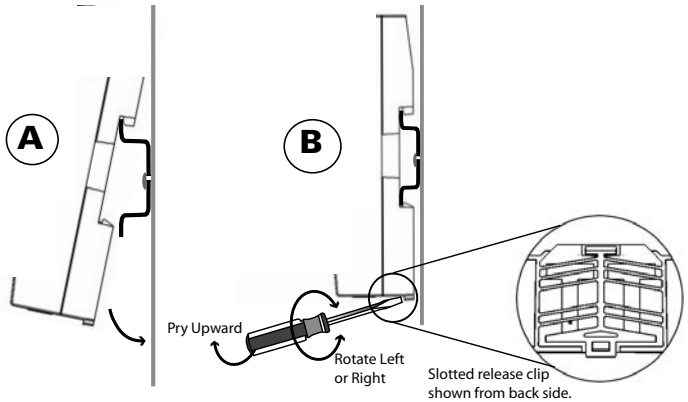
1. Hook device over top of a DIN rail (see Figure 3A).
2. Gently push on lower half of device in the direction of the arrow until the release clip snaps into place.

To remove or reposition the device:

1. Disconnect all connectors before removing or repositioning.
2. Insert screwdriver into slotted release clip and gently pry upward on the clip with the screwdriver (see Figure 3B).
3. While holding tension on the clip, lift device upward to remove or reposition.
4. If repositioned, push on the device until the release clip snaps back into place to secure the device to the DIN rail.

5

Figure 3. Installation: option 1



Option 2: Install the Tracer BACnet terminator inside an enclosure

Note: Two #8 pan-head sheet metal or two wood screws (3/4 to 1 in.) are required for installation.

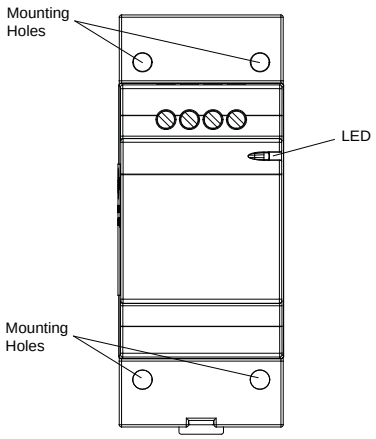
To install the device:

1. If necessary, mark and drill holes in the enclosure.
2. Drill holes suitable for #8 pan-head sheet metal or wood screws (3/4 to 1 in.).
3. Mount the device, matching the mounting holes with the predrilled holes in the enclosure.
4. Secure with screws.

The Tracer BACnet terminator has four mounting holes. Only two screws are required for proper installation.

6

Figure 4. Installation: option 2



Important: *The LED on the front of the Tracer BACnet terminator indicates that the unit is powered. If the LED is not illuminated solid green, the device may not have been wired correctly.*

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X39641151-01D 11 Jul 2011
Supersedes X39641151-01C (01 Dec 2009)

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Product Data Sheet

Tracer™ UC600 Programmable Controller

Ordering number: BMUC600AAA0100011

The Tracer UC600 unit controller is a multi-purpose, programmable, field-installed device that is designed to control the following types of equipment:

- Air-handling units (AHUs)
- Rooftop units
- Chillers
- Central heating and cooling plants
- Cooling towers
- Generic input/output (I/O) control

Features and Benefits

Feature	Benefit
BACnet MS/TP, BACnet IP	An open standard building automation communications protocol which enables connections to other BAS systems and controllers
Scheduling—supports up to 3 weekly schedules	Easy to set up and access (3 schedule types supported: Analog, Binary, Multistate)
Graphics—support for up to 10 custom graphics with optional TD7 Display.	Perform overrides, link directly to alarms, reports, or other graphics directly from a graphic.
Custom data graphs	Create and view graphically formatted data logs. Up to 8 custom data graphs can be created with a maximum of 4 data logs per graph.
Configurable and fully programmable	• Factory programs available through quick configuration for lowest setup time • Programmable for flexibility to meet unique sequence or hardware needs
Total of 19 built-in I/O hardware terminations	Meets most applied product needs with built-in I/O or with additional custom programming on the controller
Expandable up to 120 hardware terminations (with the use of optional expansion modules)	Flexibility to meet additional equipment needs
Data logging—25,000 samples	Easier investigation of equipment, zone, or building problems
Removable connectors, DIN rail mounting, multiple service tool connections	Ease of installation and service

⚠SAFETY WARNING

Only qualified personnel should install and service the equipment. The installation, starting up, and servicing of heating, ventilating, and air-conditioning equipment can be hazardous and requires specific knowledge and training. Improperly installed, adjusted or altered equipment by an unqualified person could result in death or serious injury. When working on the equipment, observe all precautions in the literature and on the tags, stickers, and labels that are attached to the equipment.

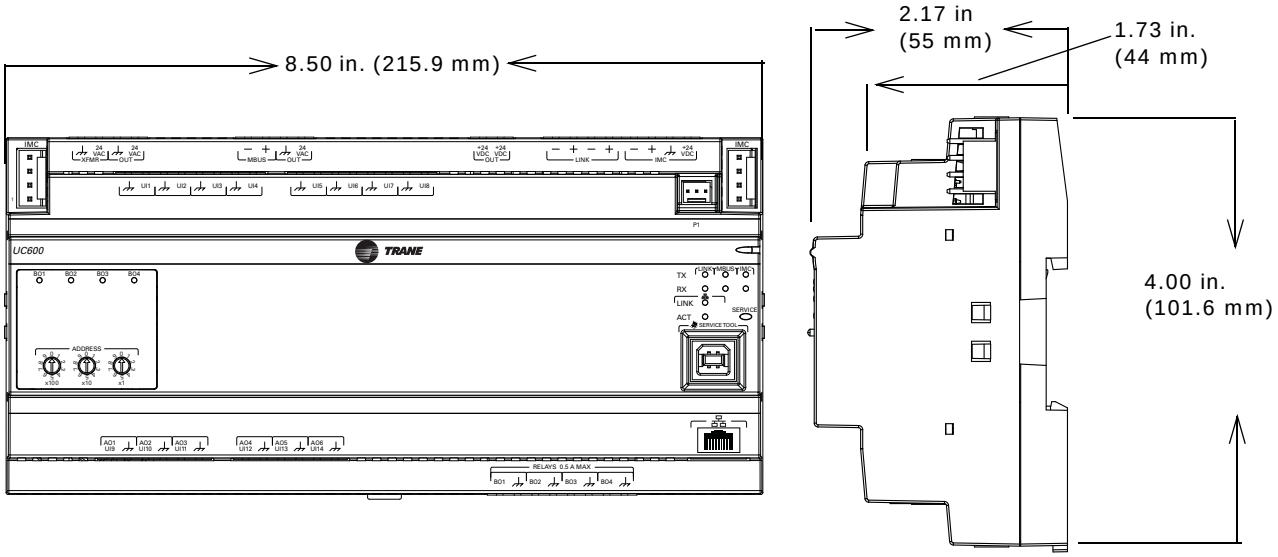
Controller Specifications and Agency Compliance

Storage	
Temperature:	-67°F to 203°F (-55°C to 95°C)
Relative humidity:	Between 5% to 95% (non-condensing)
Operating	
Temperature:	-40°F to 158°F (-40°C to 70°C)
Humidity:	Between 5% to 95% (non-condensing)
Power:	Input: 20.4–27.6 Vac (24 Vac ±15% nominal), 50 or 60 Hz, 26 VA Output: 26 VA plus a maximum of 12 VA for each binary output 24 Vdc ±10%, device max load 600 mA
Time Clock:	On-board real time clock with 7 day backup
Mounting weight of controller:	Mounting surface must support 1.3 lb. (0.6 kg)
Environmental rating (enclosure):	NEMA 1
Installation:	UL 840: Category 3
Pollution	UL 840: Degree 2
Wiring / Transformer / Communications Protocol	
18 AWG is recommended for the circuit between the transformer and the controller. Data link protocol supported: BACnet MS/TP, BACnet IP 10/100 BaseT	
• UL listed, Class 2 power transformer, 24 Vac ±10%, device max load 26 VA. • The transformer must be sized to provide adequate power to the UC600 controller (26 VA) and external device outputs. • UC600 requires 26 VA for UC600+ IO + two expansion modules (XM30 or XM32).	
Agency Compliance	
• UL916 PAZX, Open Energy Management Equipment • UL94-5V Flammability • UL864/UUKL Smoke Control (when installed and programmed in accordance with the Engineered Smoke Control System Applications Guide, BAS-APG019-EN) • CE Marked • FCC Part 15, Subpart B, Class B Limit • BTL Listed—Advanced Application Profile (B-AAC)	

Input and Output Specifications

Input / Output type	Quantity	Types	Range	Notes
Universal Input	8	Thermistor	10 kΩ Type II, 10 kΩ Type III, 2252 Ω Type II, 20 kΩ Type IV, 100 kΩ	The UC600 provides 600 mA of DC power for 0–20 mA inputs and/or outputs and to power expansion modules. See the power budget table in the *Tracer UC600 Installation, Operation, and Maintenance guid*e (*BAS-SVX045).*
		Resistive (setpoint)	100 Ω – 1 MΩ	
		RTD	Balco™ (Ni-Fe), 1 kΩ, 375 (Pt), 385 (Pt), 1 kΩ	
		Current	0–20 mA (linear)	
		Voltage	0–20 Vdc (linear)	
		Binary	Dry contact	
		Pulse Accumulator	Minimum: 20 ms, closed (on) 20 ms, open (off)	
Universal Input/ Analog Output	Configure using any combination of analog or binary inputs/analog outputs			
Inputs	6	Thermistor	10 kΩ Type II, 10 kΩ Type III, 2252 Ω Type II, 20 kΩ Type IV, 100 kΩ	
		Resistive (setpoint)	100 Ω –1 MΩ	
		RTD	Balco™ (Ni-Fe), 1 kΩ, 375 (Pt), 385 (Pt), 1 kΩ	
		Current	0–20 mA (linear)	
		Voltage	0–20 Vdc (linear)	
		Binary	Dry contact	
		Pulse accumulator	Minimum: 20 ms, closed (on) 20 ms, open (off)	
Outputs		Current	0–20 mA @16 V	
		Voltage	0–10 Vdc @20 mA	
		Pulse	12.5 ms to 1 s (12.5 ms resolution), 1–60 s (0.5 s resolution)	
Binary Output	4	Relay (form A) wet	24 Vac, 0.5A maximum	Ranges are given per contact.
Pressure Input	1	3-wire	0–5 in H_2O	Pressure input supplied with 5 Vdc. Designed for Kavlico™ pressure transducers.
Point total	**19**			

Dimensions



Additional Ordering Options

- UC600 Controller (Made in the U.S.A. Version) *(order number: BMUC600USA0100011)*
- Tracer TD7 Operator Display *(order number: X13651571010)*
- TD7 Sealed Ethernet cable (for wet environments) *(order number: X19070632020)*
- TD7 Display Portable Carry Case *(order number: X18210613010)*
- TD7 Mounting Bracket (flat surface, fixed position) *(order number: X05010511010)*
- Tracer XM30 Expansion Module (*order number: X13651537010)*
- Tracer XM32 Expansion Module (*order number: X13651563010*)
- Tracer XM70 Expansion Module (*order number: X13651568010)*
- Tracer XM70 Expansion Module, manufactured in USA (*order number: X13651597010)*
- Tracer BACnet Term (2 pack) *(order number X1365152401)*
- Tracer Large enclosure 120 VAC with display capable door (*order number: X13651552010)*
- Tracer Large enclosure 230 VAC with display capable door (*order number: X13651554010)*
- Tracer Medium enclosure 120 VAC (*order number: X13651559010*)
- Tracer Medium enclosure 230 VAC *(order number: X13651560010)*
- Tracer Small 10" DIN Rail enclosure *(order number: X19091354010)*
- Power Supply 24VAC to 1.4A 24 VDC for XM modules exceeding UC600 power budget *(order number: X1365153801)*
- IMC Harness *(order number: S3090059462)*

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BAS-PRD016B-EN 28 Feb 2015
Supersedes BAS-PRD016A-EN (01 Apr 2014)

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Product Data Sheet

Tracer™ XM30 Expansion Module

Ordering Number: X13651537010

The Tracer XM30 Expansion Module provides additional points when needed for Tracer UC400 applications. Each expansion module has a total of 4 points that can be configured using any combination of inputs/outputs (refer to the table below). A maximum of eight (8) expansion modules can be added to a Tracer UC400. Use of a PM014 DC power supply is required for applications requiring more than two XM30 modules.

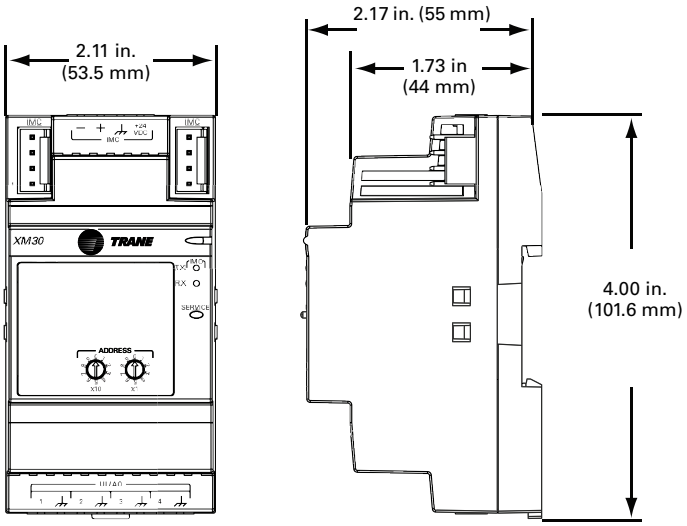
XM30 Configurable Connections

The table below provides information about the XM30 configurable connections.

Connection	Quantity	Types	Range
Inputs	**Can be configured using any combination of analog or binary inputs/analog outputs**	Thermistor	2252 Ω, 10k, 20k, 100kΩ
		Resistive (Setpoint)	100 Ω to 1 MΩ
		RTD	1 kΩ; platinum, Balco™ or nickel
		Current	0–20 mA (linear)
		Voltage	0–20 Vdc (linear)
		Binary	Dry Contact
		Pulse Accumulator	Minimum 20 milliseconds open or closed
Outputs		Current	0–20 mA @ 16V
		Voltage	0–16 Vdc @ 20mA
Overall Point Total	4		

Specifications, Agency Compliance, and Dimensions

Storage	
Temperature:	-67°F to 203°F (-55°C to 95°C)
Relative humidity:	5% to 95% (non-condensing)
Operating	
Temperature:	-40°F to 158°F (-40°C to 70°C)
Humidity:	5% to 95% (non-condensing)
Power:	24 Vdc ±10%, 120 mA
• Mounting weight of controller: • Mounting weight of controller with terminal connectors:	• Mounting surface must support 0.27 lb. (0.122 kg) • Mounting surface must support 0.31 lb. (0.142 kg)
Environmental rating (enclosure):	NEMA 1
Installation:	UL 840: Category 3
Pollution:	UL 840: Degree 2
Agency Compliance	
• UL916 PAZX- Open Energy Management Equipment • UL94-5V, Flammability • UL864/UUKL Smoke Control (when installed and programmed in accordance with the Tracer SC Applications Guide, BAS-APG019-EN • CE Marked • FCC Part 15, Subpart B, Class B Limit	



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BAS-PRC035-EN 14 May 2013
Supersedes BAS-PRC035-EN (17 Dec 2009)

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Product Data Sheet

Tracer™ XM70 Expansion Module

Ordering number: X13651568010

The Tracer XM70 Expansion Module provides additional terminations when needed for Tracer UC400 and Tracer UC600 applications. Each expansion module has a total of 19 terminations as described below.

Configurable Connections

Input / Output type	Quantity	Types	Range
Universal input (see note on p. 2)	8	Thermistor	10kΩ – Type II, 10kΩ –Type III, 2252Ω – Type II, 20kΩ – Type IV, 100 kΩ
		Resistive (Setpoint)	100Ω – 1MΩ
		RTD	1kW; 385 platinum, Balco™ or 672 nickel
		Current	0–20 mA (linear)
		Voltage	0–20 Vdc (linear)
		Binary	Dry contact
		Pulse Width Accumulator	Minimum 20 ms, opened or closed
Universal Input/Analog Output	Configure using any combination of analog or binary inputs/analog outputs		
Inputs (see note on p. 2)	6	Thermistor	10kΩ – Type II, 10kΩ –Type III, 2252Ω – Type II, 2l0kΩ – Type IV, 100 kΩ
		Resistive (Setpoint)	100Ω –1MΩ
		RTD	1kΩ; 385 platinum, Balco™ or 672 nickel
		Current	0–20 mA (linear)
		Voltage	0–20 Vdc (linear)
		Binary	Dry contact
		Pulse Width Accumulator	Minimum 20 ms, opened or closed
Outputs (see note on p. 2)		Current	0–20 mA @16 V
		Voltage	0–10 Vdc @20 mA
		Pulse	12.5ms to 1 second (12.5ms resolution), 1 second to 60 seconds (0.5 second resolution)
Binary output	4	Relay – SPST (form A)	24 VAC, 0.5A maximum. Ranges are given per contact.
Pressure input	1	3-wire	0–5 incw. Supplied with 5 Vdc - designed for Kavlico™ tranducers.

Configurable Connections (Notes)

- Universal Inputs: Require the following to meet the 25Hz requirement: duty cycle between 30% to 70%relay output - no load present when open.
- Inputs/Outputs: The XM70 is limited to 10 combined 0-20 mA current inputs/outputs when powering up to two expansion modules (XM30/32).
- Analog Outputs: Limited to 0-10 Vdc by software.

Specifications

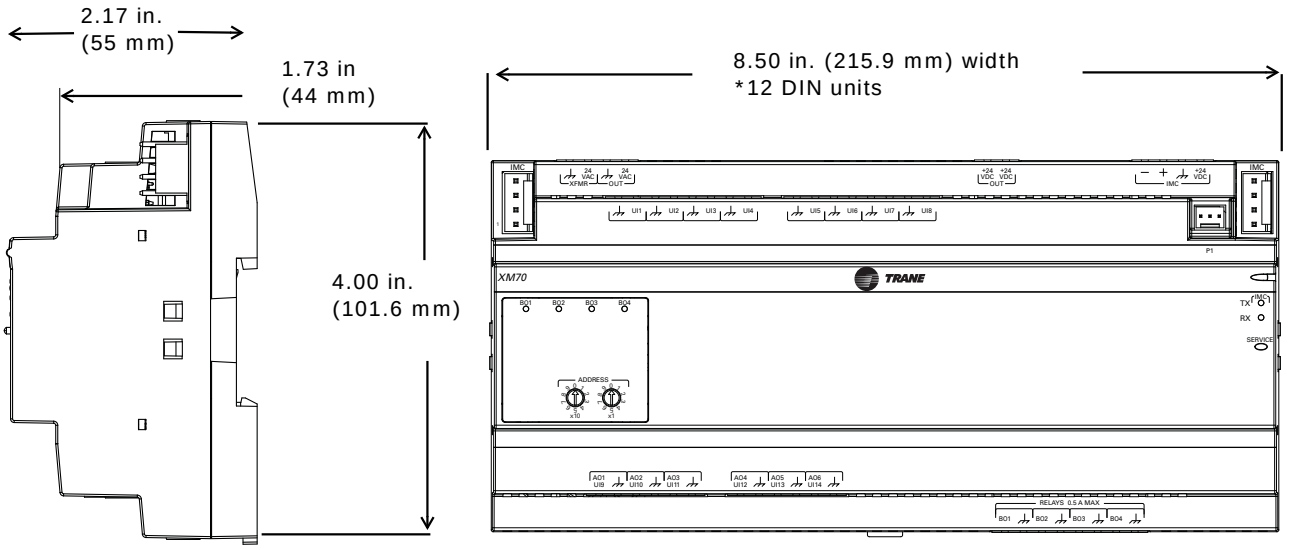
Storage	
Temperature:	-67°F to 203°F (-55°C to 95°C)
Relative humidity:	5% to 95% (non-condensing)
Operating	
Temperature:	-40°F to 158°F (-40°C to 70°C)
Humidity:	Between 5% to 95% (non-condensing)
Power:	Input: 20.4–27.6 Vac (24 Vac, ±15% nominal) 50 or 60 Hz, 26 VA (26 VA plus a maximum of 12 VA for each binary output) Output: 24 Vdc, ±10%, device max load 600 mA
Mounting weight of controller:	Mounting surface must support 1.3 lb. (0.6 kg)
Environmental rating (enclosure):	NEMA 1
Installation:	UL 840:Category 3
Pollution:	UL 840:Degree 2
Agency Compliance	
• UL916 PAZX- Open Energy Management Equipment • UL94-5V Flammability • UL864/UUKL Smoke Control (when installed and programmed in accordance with the Engineered Smoke Control System Applications Guide, BAS-APG019-EN) • CE Marked • FCC Part 15, Subpart B, Class B Limit	

Dimensions

The following figure illustrate dimensions for the Tracer XM70 expansion module. DIN width measurements help determine how many modules can be installed on a DIN rail. Use the following standard:

DIN Standard 43 880 standard profile, Built-in Equipment for Electrical Installations, Overall Dimensions and Related Mounting Dimensions.

*One DIN unit = 18 mm.



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BAS-PRC061-EN 14 May 2013
Supersedes BAS-PRC061-EN (31 Jul 2012)

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Installation Instructions

Enclosure for Tracer® DIN-mounted Controllers

Order Number: X13651559010 120 Vac with 1 outlet, X13651699001 120 Vac with 3 outlets and X13651560010 (230 Vac without outlet)

1

Packaged Contents

- One (1) enclosure
- Four (4) #10 (5mm) screws with anchors

Model Numbers

Before installing the controller, verify the correct model for local power requirements. The model number is on the shipping label or on the product label inside the enclosure.

⚠ SAFETY WARNING

Only qualified personnel should install and service the equipment. The installation, starting up, and servicing of heating, ventilating, and air-conditioning equipment can be hazardous and requires specific knowledge and training. Improperly installed, adjusted or altered equipment by an unqualified person could result in death or serious injury. When working on the equipment, observe all precautions in the literature and on the tags, stickers, and labels that are attached to the equipment.

December 2017 **X39641180-01G**

2

Cautions, Warnings and Notices

⚠ WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

⚠ CAUTION

Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury. It may also be used to alert against unsafe practices.

NOTICE

Indicates a situation that could result in equipment or property-damage only accidents.

⚠ CAUTION

Use the equipment only as specified!

The use of the enclosure in a manner not specified in this document may impair the protection provided by the enclosure.

NOTICE

Avoid Equipment Damage!

Install and use the controllers as specified by the manufacturer. Failure to do so could result in equipment damage.

⚠ WARNING

Personal Protective Equipment Required!

Installing/servicing this unit could result in exposure to electrical, mechanical and chemical hazards. Before installing/servicing this unit, technicians MUST put on all Personal Protective Equipment (PPE) recommended for the work being undertaken. ALWAYS refer to appropriate MSDS sheets and OSHA guidelines for proper PPE. When working with or around hazardous chemicals, ALWAYS refer to the appropriate MSDS sheets and OSHA guidelines for information on allowable personal exposure levels, proper respiratory protection and handling recommendations. If there is a risk of arc or flash, technicians MUST put on all necessary Personal Protective Equipment (PPE) in accordance with NFPA70E for arc/flash protection PRIOR to servicing the unit. Failure to follow recommendations could result in death or serious injury.

3

Specifications and Dimensions

Operating Environment Specifications

Ensure that the operating environment conforms to the specifications listed in Table 1.

Table 1. Specifications

Temperature:	From 32°F to 122°F (0°C to 50°C)
Humidity:	5–95% non-condensing
Power Requirements:	• **X13651559001** 120 Vac: 6A maximum, 1 phase, 60 Hz • **X13651699001** 120 Vac: 9A maximum, 1 phase, 60 Hz • **X13651560010** 230 Vac: 1A maximum, 1 phase, 50/60 Hz
Weight:	Mounting surface must be able to support 60 lb. (28 kg)
Dimensions:	16 ½ in. × 14 ¾ in. × 5 ½ in. (418 mm × 373 mm × 140 mm)
Installation:	U.L. 840: Category 3
Pollution:	U.L. 840: Degree 2

The power output of the panel is de-rated at higher ambient temperatures to account for the heat rise in the panel. Table 2 shows the ratings.

Table 2. Power Output

VA at 24 Vac	Temperature Range C°/F°
85	up to 35°C (95°F)
75	up to 45°C (113°F)
50	up to 50°C (122°F)

4

DIN Unit Width

The following table provides DIN unit width measurements for Trane and non-Trane devices.

Table 3. DIN Unit Width Measurements

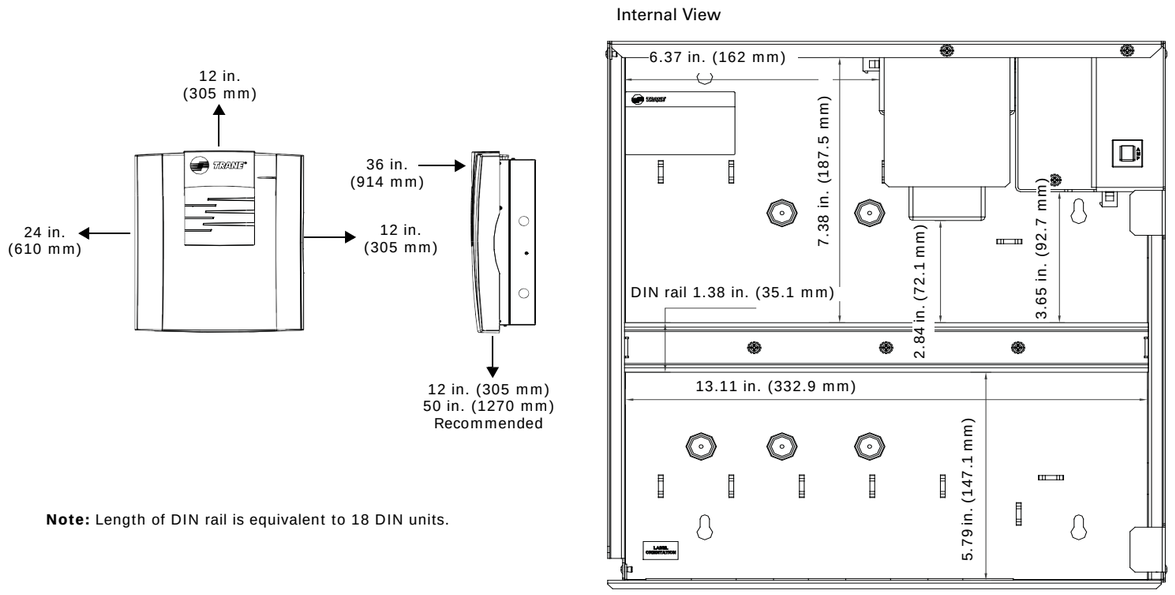
Device	Device Width (mm/in)	DIN Unit Width (1 unit = 18 mm)
Tracer SC+/Tracer Concierge controller	143.6 mm/5.6 in	8
Tracer UC400 controller	143.6 mm/5.6 in	8
Tracer UC600 controller	215.5 mm/8.5 in	12
Tracer UC800 controller	71.6 mm/2.8 in	4
Tracer XM30 expansion module	53.6 mm/2.1 in	3
Tracer XM32 expansion module	71.6 mm/2.8 in	4
PM014 power supply module	107.6 mm/4.2 in	6
Tracer BACnet® terminator	35.6 mm/1.4 in	2
IzoT U60 FT USB Network Interface Module*	35 mm/1.38 in	2

*LON interface

5

Ensure that the selected location provides enough space for the minimum clearances. Refer to Figure 2 for external dimensions.

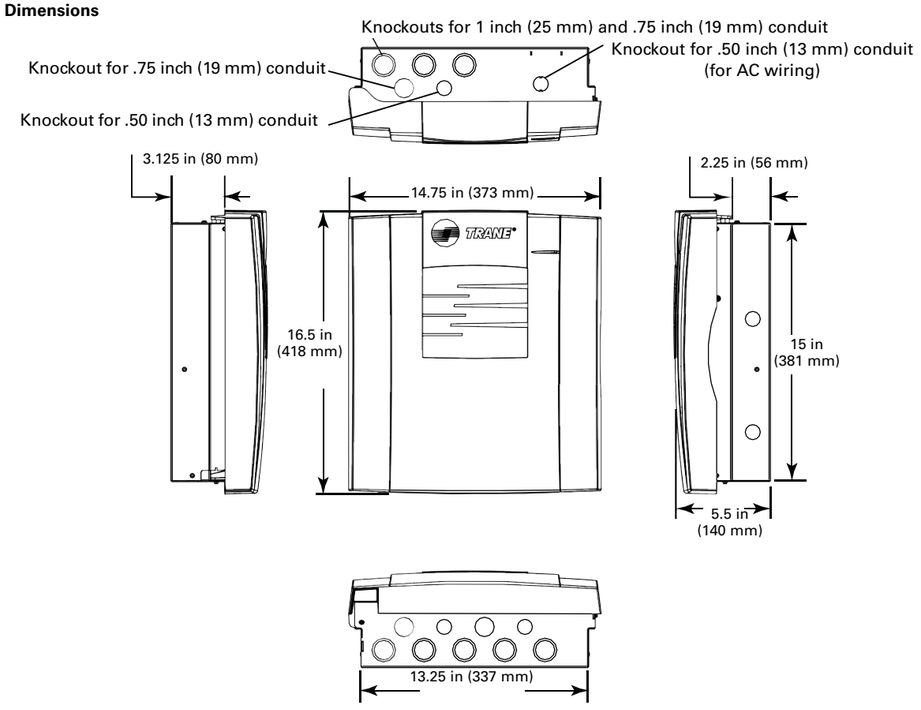
Figure 1. Minimum Clearances and Internal Dimensions



Note: Length of DIN rail is equivalent to 18 DIN units.

6

Figure 2. External Dimensions



7

Mounting and Wiring

Location

Ensure that the location meets the operating environment requirements and clearance requirements described in the previous sections. The controller must be installed indoors. Trane recommends locating the controller:

- Near the controlled equipment to reduce wiring.
- Where service personnel have easy access.
- Where public access is restricted to minimize possible tampering or vandalism.

Mounting Instructions

1. Using the enclosure as a template, mark the location of the four (4) mounting holes on the mounting surface.
2. Set aside the enclosure and drill the holes for the screws at the marked locations.

   Note: *Drill holes for #10 (5 mm) screws or #10 wall anchors. Use wall anchors if the mounting surface is dry wall or masonry.*
3. Secure the enclosure to the mounting surface with the enclosed #10 (5 mm) screws or #10 wall anchors.

Wiring High-voltage AC Power

⚠ WARNING

Hazardous Voltage!

Disconnect all electrical power, including remote disconnects, before servicing. Follow proper lockout/tagout procedures to ensure the power cannot be inadvertently energized. Failure to disconnect power before servicing could result in death or serious injury.

8

⚠ WARNING

Proper Field Wiring and Grounding Required!

All field wiring MUST be performed by qualified personnel. Improperly installed and grounded field wiring poses FIRE and ELECTROCUTION hazards. To avoid these hazards, you MUST follow requirements for field wiring installation and grounding as described in NEC and your local/state electrical codes. Failure to follow code could result in death or serious injury.

NOTICE

Use Copper Conductors Only!

Unit terminals are designed to accept copper conductors only. Other conductors could cause equipment damage.

To ensure proper operation of the controller, install the power supply circuit in accordance with the following guidelines:

- The panel must receive power from a dedicated power circuit. Failure to comply could cause panel malfunctions.
- **230 Vac:** The power circuit must be protected by a 13 A or 16 A circuit breaker or fuse.
- A disconnect switch for the dedicated power circuit must be near the panel, within easy reach of the operator, and marked as the disconnecting device for the panel.
- 24 Vac or higher power-wire conduits or wire bundles must not contain input/output wires. Failure to comply could cause the controller to malfunction due to electrical noise.
- Power wiring must comply with the National Electrical Code™ (NEC) and applicable local electrical codes.
- Both 120/230 Vac wiring requires three-wire service (line, neutral, ground).
- **120 Vac Nominal:** Transformer Voltage Utilization Range; 98-132 Vac.

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- **230 Vac Nominal:** Transformer Voltage Utilization Range; 196–264 Vac. The panel automatically detects whether the current is 50 or 60 cycle.

To connect either 120 or 230 Vac power wires:

1. Lock open the supply-power disconnect switch.
2. At the top-right corner of the enclosure, remove the knockout for .50 inch (13 mm) conduit.
3. Open or remove the enclosure door if it is already installed.
4. Inside of the enclosure at the top-right corner, remove the line voltage area cover plate.
5. Feed the 120/230 Vac power wire into the enclosure.
6. Using Figure 3,connect the line wire to the **'L'** terminal.
7. Connect the neutral wire to the **'N'** terminal.
8. Connect the green ground wire to the chassis ground screw.

   Note: *The ground wire should be continuous back to the circuit breaker panel.*

⚠ WARNING

Hazardous Voltage!

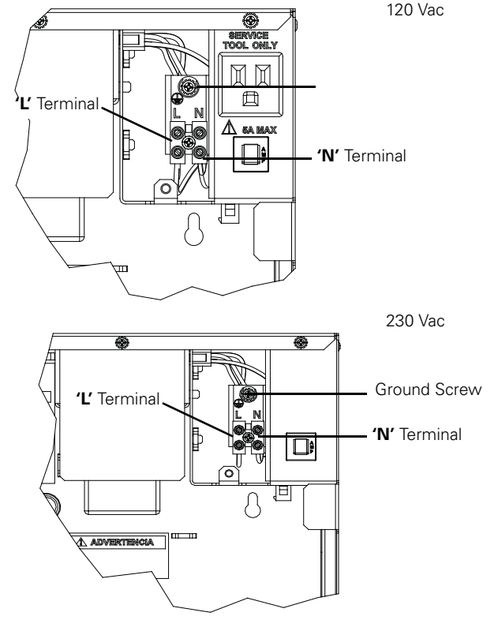
The cover plate must be in place when the controller is operating. Failure to replace the cover plate could result in death or serious injury.

9. Replace the cover plate.

10

10. On a field-supplied label, record the location of the circuit breaker panel and the electrical circuit. Attach the label to the cover plate.

Figure 3. AC Wiring



11

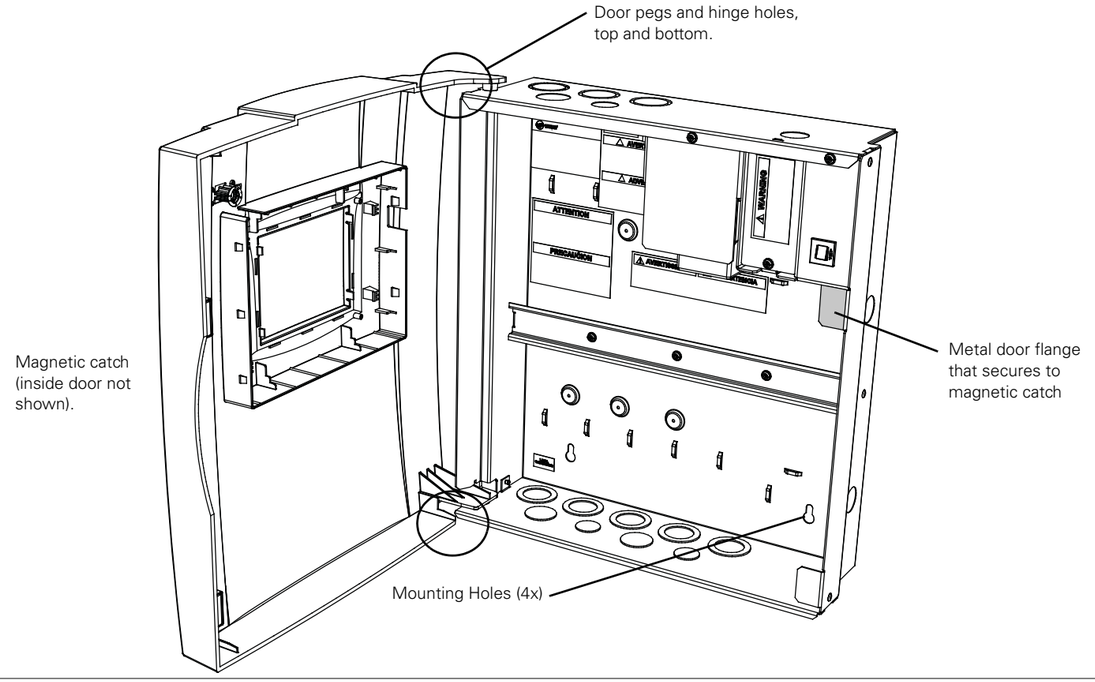
Installing the Enclosure Door

Note: *Before installing the enclosure door, unpack the door and check for missing or damaged parts and any cracks in the plastic. Ensure that the magnetic catch is installed.*

1. Hold the door at a 90° angle from the enclosure as shown in Figure 4.
2. Align the hinge pegs on the door with the hinge holes on the enclosure.
3. Lower the door until it rests securely in the hinge holes.
4. Verify that the door swings freely on the hinges and that the magnetic catch holds the door securely when it is closed.

12

Figure 4. Door Alignment



13

Agency Listings and Compliance

The European Union (EU) Declaration of Conformity is available from your local Trane® office.

Ingersoll Rand (NYSE:IR) advances the quality of life by creating comfortable, sustainable and efficient environments. Our people and our family of brands—including Club Car®, Ingersoll Rand®, Thermo King® and Trane®—work together to enhance the quality and comfort of air in homes and buildings; transport and protect food and perishables; and increase industrial productivity and efficiency. We are a global business committed to a world of sustainable progress and enduring results.

ingersollrand.com

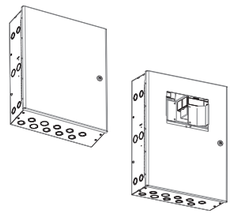
X39641180-01G 30 Dec 2017
Supersedes X39641180-01F (24 Mar 2016)

Installation Instructions

Enclosure for Tracer DIN-mounted Controllers (120 VAC)

Order Numbers:

X13651618010 (Solid Door)
X13651619010 (Display-capable Door)



⚠ SAFETY WARNING

Only qualified personnel should install and service the equipment. The installation, starting up, and servicing of heating, ventilating, and air-conditioning equipment can be hazardous and requires specific knowledge and training. Improperly installed, adjusted or altered equipment by an unqualified person could result in death or serious injury. When working on the equipment, observe all precautions in the literature and on the tags, stickers, and labels that are attached to the equipment.

October 2013

X39641238-01B

1

⚠ WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury

⚠ CAUTION

Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury. It may also be used to alert against unsafe practices.

Notice

Indicates a situation that could result in equipment or property-damage only accidents.

Packaged Contents

- One (1) enclosure
- Four (4) #10 [5mm] screws with #10 wall anchors for mounting
- Five (5) M4 screws for installing enclosure door

Model Numbers

Before installing the controller, verify the correct model for local power requirements. The model number is located on the shipping label or on the product label inside the enclosure.

Replacement Parts

- One (1) Enclosure Latch (Part No. LAT00998)
- One (1) Enclosure TD7 Capable Door (Part No. DOR04185)
- One (1) Enclosure Solid Door (Part No. DOR04184)
- One (1) Enclosure Back Chassis (Part No. MOD02560)
- One (1) Enclosure Power Section Cover (Part No. COV04754)
- One (1) 120 VAC Transformer (Part No. TRR02421)
- One (1) 24 VAC Cable (Part No. CAB01401

2

Specifications and Dimensions

Operating Environment Specifications

Ensure the operating environment conforms to the specifications listed in Table 1.

Table 1. Specifications

Temperature	From 32°F to 122°F (0°C to 50°C)
Humidity	5–95% non-condensing
Power requirements	120 VAC, 5A maximum, 1 phase, 60 Hz
Weight	Mounting surface must be able to support 75 lb (34 kg)
Dimensions	15 in. x 20 in. x 5.5 in. (38 cm x 51 cm x 14.0 cm)
Installation	U.L. 840: Category 3
Pollution	U.L. 840: Degree 2

The power output of the panel is rated at higher ambient temperatures to account for the heat rise in the panel. Refer to Table 2 for power ratings.

Table 2. Power Output For Transformer

VA at 24 VAC	Temperature Range C°/F°
85	Up to 95°F (35°C)
75	Up to 113°F (45°C)
50	Up 122°F to (50°C)

3

DIN Unit Widths

The following table provides DIN unit width measurements for Trane devices.The enclosure DIN rail is approximately 20 DIN unit widths.

Table 3. DIN Unit Width Measurements

Device	Device Width (inch/millimeter	DIN Unit Widths (1 unit = 0.8 in. [18 mm])
Tracer SC system controller	5.6 in. / 142.2 mm	8
Tracer UC400 controller	5.6 in. / 142.2 mm	8
Tracer UC600 controller	8.5 in. / 216.0 mm	12
Tracer UC800 controller	2.8 in. / 71.1 mm	4
Tracer XM30 expansion module	2.1 in. / 53.3 mm	3
Tracer XM32 expansion module	2.8 in. / 71.1 mm	4
Tracer XM70 expansion module	8.50 in. / 216.0 mm	12
PM014 power supply module	4.2 in. / 106.7 mm	6
Tracer BACnet terminator	1.4 in. / 35.6 mm	2

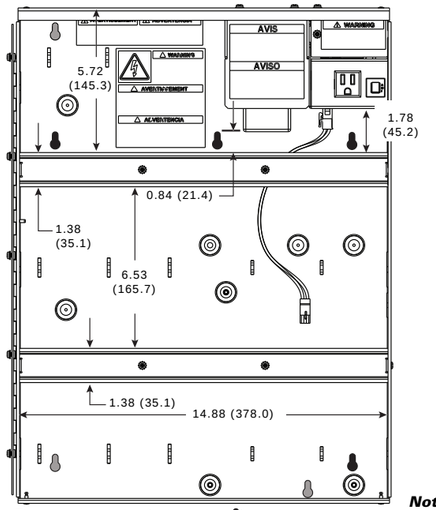
4

Dimensions and Clearances

The figure below shows the internal enclosure dimensions and minimum clearances. Select a mounting location that provides adequate space for the minimum clearance dimensions. Refer to Figure 2 in Panel 5 for external enclosure dimensions.

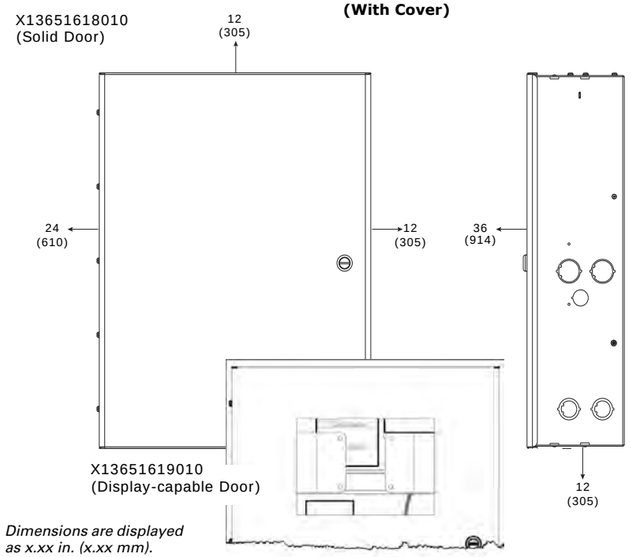
Figure 1. Minimum Clearances and Internal Dimensions

Enclosure Internal View



The mounting holes (indicated as) may be covered if the enclosure includes factory-installed devices.

Enclosure Minimum Clearances (With Cover)



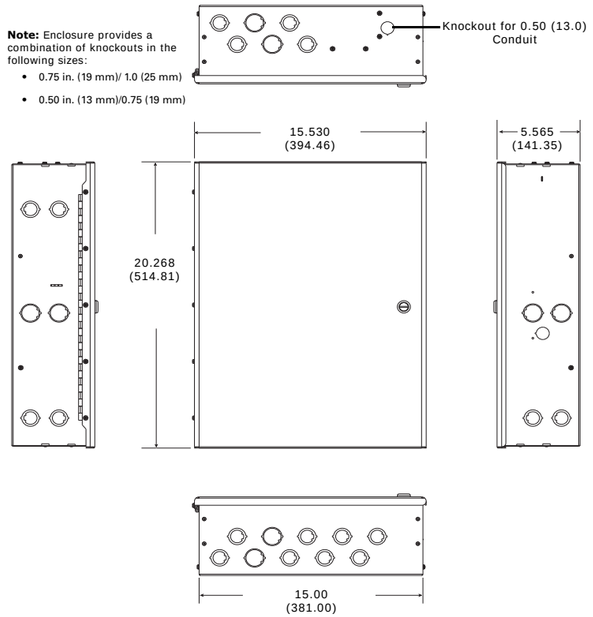
Note: *Dimensions are displayed as x.xx in. (x.xx mm).*

5

Figure 2. External Dimensions

Note: Enclosure provides a combination of knockouts in the following sizes:

- 0.75 in. (19 mm)/ 1.0 (25 mm)
- 0.50 in. (13 mm)/0.75 (19 mm)



Note: *Dimensions are displayed as x.xx in. (x.xx mm).*

6

Location and Mounting Guidelines

Location

The location should meet the operating environment requirements and clearances described in the previous sections.

Important: *The controller must be installed indoors.*

Trane recommends locating the controller:

- Near the controlled equipment to reduce wiring.
- Where service personnel have easy access.
- In areas that restrict public access to minimize tampering or vandalism.

Mounting Instructions

Note: *The internal enclosure panel comes with seven (7) mounting holes (refer to the locations in Panel 4). It is only required to choose 4 of the 7 locations in order to hold the weight of the enclosure. If mounting is performed by a single individual, first drill the centrally located mounting hole shown in Panel 4. Then insert 1 screw to temporarily hold the internal enclosure panel and complete the mounting following the steps below.*

1. Using the enclosure as a template, mark the location of the four (4) mounting holes on the mounting surface to accommodate the supplied #10 screws and/or #10 wall anchors.
2. Set aside the enclosure and drill the marked location holes for the screws.

   Note: *Use wall anchors if the mounting surface is dry wall or masonry.*
3. Secure the enclosure to the mounting surface with the enclosed #10 screws and #10 wall anchors.

7

Wiring High Voltage AC Power

Read all WARNINGS, CAUTIONS, and *NOTICES* prior to wiring high-voltage AC power.

⚠ WARNING

Hazardous Voltage!
Disconnect all electrical power, including remote disconnects, before servicing. Follow proper lockout/tagout procedures to ensure the power cannot be inadvertently energized. Failure to disconnect power before servicing could result in death or serious injury.

⚠ WARNING

Proper Field Wiring and Grounding Required!
All field wiring MUST be performed by qualified personnel. Improperly installed and grounded field wiring poses FIRE and ELECTROCUTION hazards. To avoid these hazards, you MUST follow requirements for field wiring installation and grounding as described in NEC and your local/state electrical codes. Failure to follow code could result in death or serious injury.

NOTICE

Use Copper Conductors Only!
Unit terminals are designed to accept copper conductors only. Other conductors could cause equipment damage.

8

To ensure proper operation of the controller, install the power supply circuit in accordance with the following guidelines:

- The panel must receive power from a dedicated power circuit. Failure to comply could cause panel malfunctions.
- A disconnect switch for the dedicated power circuit must be near the panel, within easy reach of the operator, and marked as the disconnecting device for the panel.
- Neither 24 VAC, higher power-wire conduits, nor wire bundles must not contain input or output wires. Failure to comply could cause the controller to malfunction due to electrical noise.
- Power wiring must comply with the National Electrical Code™ (NEC) and applicable electrical codes.
- 120 VAC wiring requires three-wire service (**L**ine, **N**eutral, **G**round). Refer to Panel 10 for terminal locations.

  Note: *The transformer voltage utilization range is 98–132 VAC (120 VAC nominal).*

Connecting the 120 VAC Power Wires

1. Lock open the supply power disconnect switch.
2. At the top-right corner of the enclosure, remove the 0.50 inch (13 mm) conduit knockout.
3. If already installed, open or remove the enclosure door.
4. Inside of the enclosure at the top-right corner, remove the line voltage area cover plate and then feed the 120 VAC power wire into the enclosure.
5. Connect the line wire to the **L** terminal, the neutral wire to the **N** terminal, and the green ground wire to the chassis **G**round screw as shown in Figure 3, Panel 10.

   Note: *The ground wire should be a continuous wire back to the circuit breaker panel.*

9

⚠ WARNING

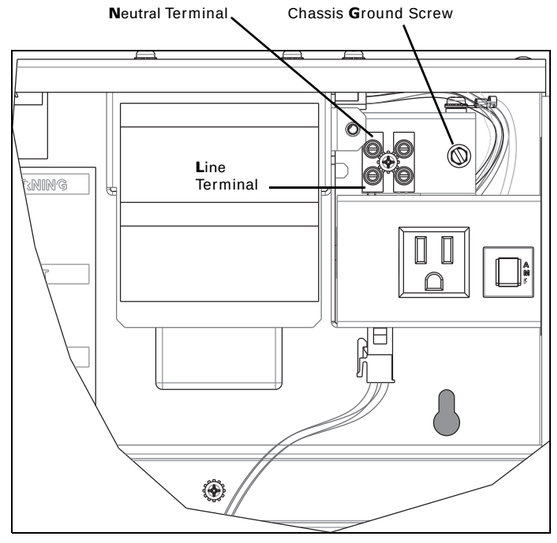
Hazardous Voltage!

The cover plate must be in place when the controller is operating. Failure to replace the cover plate could result in death or serious injury.

6. Replace the cover plate.
7. On a field-supplied label, record the location of the circuit breaker panel and the electrical circuit. Attach the label to the cover plate.

10

Figure 3. AC Wiring for 120 VAC



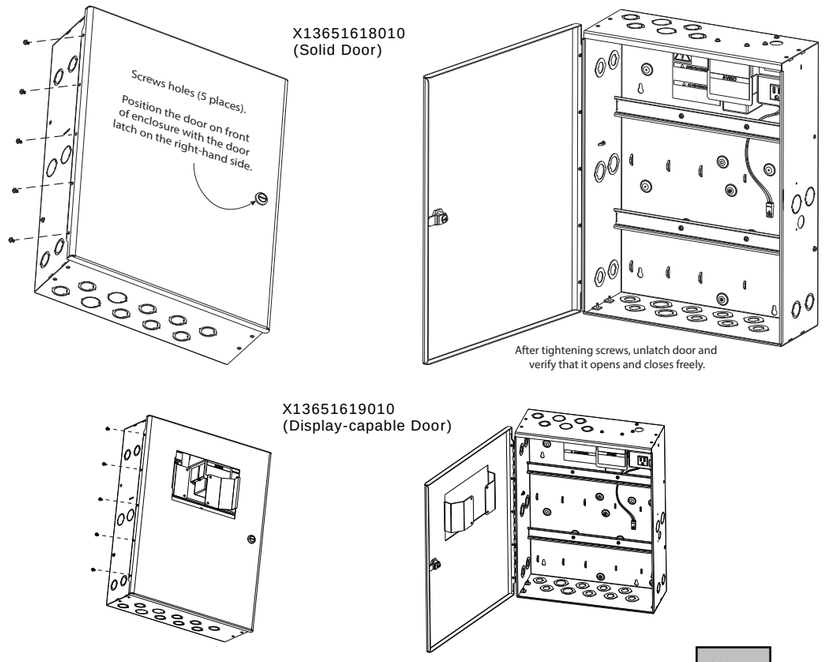
11

Installing the Enclosure Door

1. Remove packaging from the door and locate the provided five (5) M4 screws.
2. Position the door on the front of the enclosure in its approximate position with the latch on the right-hand side.
3. Lock the enclosure door to assist in holding the door on the enclosure.
4. Align the screw holes with the threaded hardware on the door hinge so the screws can be inserted through the door as shown in Figure 4, Panel 12.
5. Insert the five (5) screws into the aligned holes and only finger tighten all screws at this time.
6. While applying slight upward pressure on the door, use a screwdriver to securely tighten one (1) screw on the upper portion of the door and one (1) screw on the lower portion of the door.
7. Unlatch the door and ensure that it freely opens and closes.
8. Finally, tighten the remaining screws.

12

Figure 4. Installing the Enclosure Door



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Agency Listings and Compliance

United States Compliance
UL Listed — UL 916 Energy Management Accessory
Canada Compliance
CUL Listed — CSA C22.2 No. 205

TRANE

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X39641238-01B 30 October 2013
NEW

We are committed to using environmentally conscious print practices that reduce waste.

Ingersoll Rand

Product Data Sheet


Wall Mount


Duct Mount

CO_2 Sensors

Part numbers: (Duct Mount) X13790423010, VACO2DUCT010, SEN01092 (Wall Mount) X13790422010, VACO2ZONE010, SEN01087

The maintenance-free carbon dioxide (CO_2) sensor is primarily designed for return air based demand-controlled ventilation applications.The exceptional stability and reliable performance comes from advanced silicon-based Non-Dispersive InfraRed (NDIR) technology combined with Automatic Background Calibration (ABC) and passive gas diffusion (no moving parts).The CO_2 sensor is designed to operate from either a 24 Vac or 24 Vdc power supplied from the HVAC controller.

Features and Benefits

Features	Benefits
High accuracy	Reduced energy costs and improved environmental quality
0–2000 ppm range	Effective control of CO_2 levels for optimized energy efficiency and air quality
Multiple outputs (0–10VDC or 4–20 mA)	Flexible for use with a wide range of Trane direct digital control (DDC) control
Automatic self-diagnostics	Diagnostic tools are built-in for minimized troubleshooting expenses
Maintenance-free design	Auto-calibration and reduced maintenance costs
Trane wall enclosure	Consistent enclosure designs for improved aesthetics

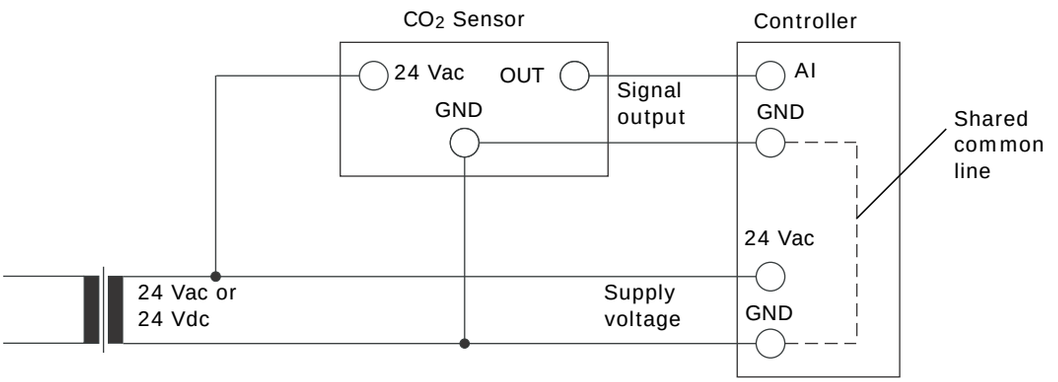
Specifications

Type	Description
Duct mount	3.3 in x 1.8 in x 5.6 in (84 mm x 46 mm x 142 mm)
Wall mount	4.8 in x 2.9 in x 1.1 in (121 mm x 74 mm x 28 mm)
Probe length	8.00 in (203 mm)
CO_2 range	0–2000 ppm CO_2
Accuracy at 25°C	±30 ppm CO_2 +3% of reading (includes repeatability)
Pressure dependence of output	+1.6% of reading per kPa
Annual zero drift	±10 ppm
Recommended calibration interval	None (auto-calibrated)
Response time	< 3 minutes

Specifications (continued)

Type	Description
Operating temperature	From 32°F to 122°F (0°C to 50°C)
Storage temperature	From -40°F to 158°F (-40°C to 70°C)
Humidity range	0–85% relative humidity (RH)
Airflow range	0–33 ft/s (0–10 m/s)
Output signals	• OUT1 (V): 0–10 VDC • OUT2 (I): 4–20 mA or 2–10 VDC (jumper controlled) **Note:** Sensor is capable of both simultaneously
Resolution of analog outputs	2ppm CO_2 Voltage: Rout < 100 Ω, RLoad > 5 kΩ
Recommended external load	Current: RLoad > 500 Ω
Power supply	Nominal 24 Vac or 24 Vdc
Power consumption	< 1 watt average
Warm-up time	≤ 1 min @full spec ≤ 15 min
Housing material	ABS (duct), polycarbonate/ABS blend (wall)

Wiring Schematic



Trane optimizes the performance of homes and buildings around the world. A business of Ingersoll Rand, the leader in creating and sustaining safe, comfortable and energy efficient environments, Trane offers a broad portfolio of advanced controls and HVAC systems, comprehensive building services, and parts. For more information, visit www.Trane.com.

Trane has a policy of continuous product and product data improvement and reserves the right to change design and specifications without notice.

BAS-PRC024-EN 09 Dec 2011
Supersedes BAS-PRC024-EN (05 Mar 2010)

We are committed to using environmentally conscious print practices that reduce waste.

Product Data Sheet

Combination Zone Sensors

Trane™ relative humidity and temperature sensors utilize a polymer capacitive-sensing element for reliable sensing accuracy and superb recovery from saturation. Temperature output is provided by a 10 kΩ, Type II thermistor. Both sensors are housed in a common enclosure for reduced installation costs and improved appearance.

Features, Benefits, and Part Number:

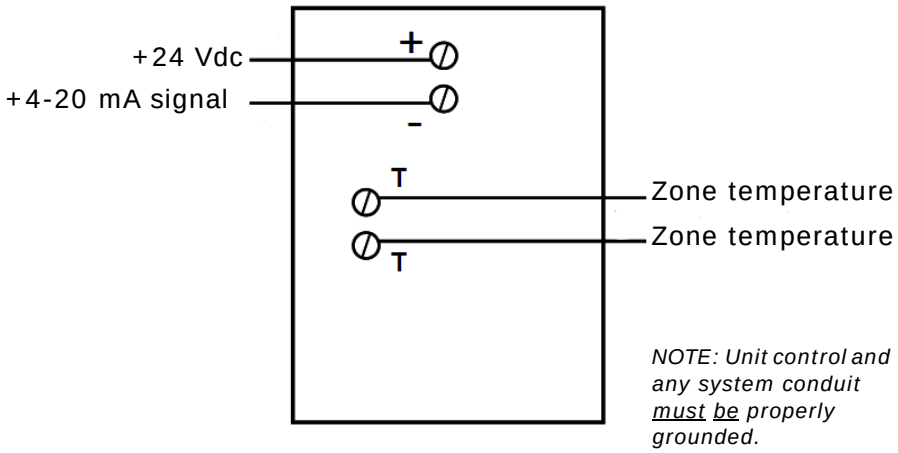
Features	Benefits
Two sensors in one enclosure	Reduces installation costs and improved building aesthetics
High accuracy	Reduces energy costs and improves environmental control and comfort
Maintenance-free design	Reduces field calibration and maintenance costs
Polymer capacitive element	Superb recovery from saturation reduces maintenance and downtime
Trane wall enclosure	Consistent enclosure design improves building aesthetics

Model Description		Part Number	BAYSENS	Global Parts
Sensors	3% Relative Humidity and Temperature	X1379044401	BAYSENS036A	SEN01561

Specifications

Description	
Sensor operating temperature	From -20°F to 140°F (-29°C to 60°C)
Storage temperature	From -85°F to 158°F (-65°C to 70°C)
Operating humidity range	From -40°F to 185°F (-40°C to 85°C)
Storage/operating humidity range	99% relative humidity (RH), noncondensing
Accuracy	±3% RH over 20% to 95% RH at 77°F (25°C) and includes hysteresis, linearity, and repeatability
Hysteresis	Less that 1% RH
Repeatability	0.5% RH
Sensitivity	0.1% RH
Thermistor resistance	10 kΩ at 77°F
Temperature accuracy	±0.36°F (±0.2°C)
Supply voltage	18 to 36 Vdc
Output characteristics	4-20 mA for 0% to 100% RH
Drift rate	Less that 1% per year
Sensing element	Polymer capacitive
Mounting	Fits a standard 2 in. by 4 in. junction box (vertical mount only). Mounting holes are spaced 3.2 in. (83 mm) apart on vertical center line. Includes mounting screws for junction box or wall anchors for sheet-rock walls. Overall dimensions: 2.9 in (74 mm) by 4.7 in. (119 mm)

Schematic (Typical)



NOTE: Unit control and any system conduit must be properly grounded.

Literature Order Number	BAS-PRC026-EN
Date	May 2008
Supersedes	BAS-PRC026-EN (Jan 08)

www.trane.com

For more information, contact your local Trane office or e-mail us at comfort@trane.com

B3 Series, Three Way, Characterized Control Valve
Stainless Steel Ball and Stem

Application

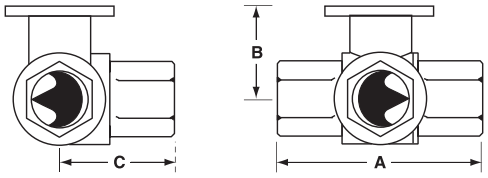
This valve is typically used in air handling units on heating or cooling coils, and fan coil unit heating or cooling coils. Some other common applications include Unit Ventilators, VAV box re-heat coils and bypass loops. This valve is suitable for use in a hydronic system with variable or constant flow.

Technical Data

Service	chilled or hot water, 60% glycol
Flow characteristic	A-port equal percentage B-port modified for constant common port flow
Controllable Flow Range	75°
Sizes	½", ¾", 1", 1¼", 1½", 2"
Type of end fitting	NPT female ends
Materials:	
Body	forged brass, nickel plated
Ball	stainless steel
Stem	stainless steel
Seats	PTFE
Characterizing disc	Tefzel®
Packing	2 EPDM O-rings, lubricated
Body pressure rating	
600 psi	½" - 1"
400 psi	1¼" - 2"
Media temp. range	0°F to 250°F [-18°C to 120°C]
Close off pressure	
200 psi	½" - 2"
Maximum differential pressure (ΔP)	50 psi for typical applications
Leakage	0% for A to AB <2.0% for B to AB
External leakage	according to EN 12266-1:2003
C_v rating	A-port: see product chart for values B-port: 70% of A to AB C_v

Tefzel® is a registered trademark of DuPont

Dimensions



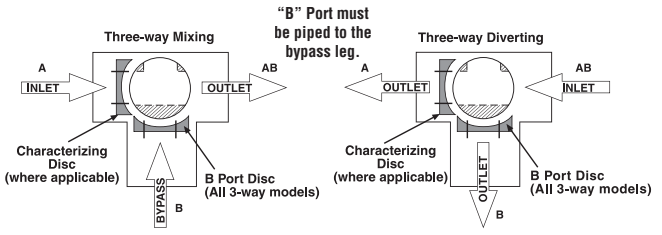
3WayValve-B307-B320

Valve Body	Valve Nominal Size Inches	DN [mm]	Dimensions (Inches [mm]) A	B	C
B307-B311	½"	15	2.41" [61.1]	1.39" [35.2]	1.20" [30.6]
B312-B316	½"	15	2.38" [60.4]	1.78" [45.2]	1.29" [32.8]
B317-B321	¾"	20	2.73" [69.3]	1.87" [47.4]	1.47" [37.3]
B322-B325	1"	25	3.09" [78.4]	1.87" [47.4]	1.59" [40.3]
B329-B331	1¼"	32	3.96" [100.6]	2.27" [57.7]	2.14" [54.3]
B338-B341	1½"	40	4.39" [111.6]	2.51" [63.7]	2.40" [61.1]
B347-B352	2"	50	4.90" [124.5]	2.73" [69.5]	2.74" [69.7]

C_v	Valve Nominal Size Inches	DN [mm]	Type 3-Way NPT	Suitable Actuators Non-Spring	Spring
0.3	½	15	B307	TR Series, LR Series, NR...N4 Series	TF Series, LF Series
0.46	½	15	B308		
0.8	½	15	B309		
1.2	½	15	B310		
1.9	½	15	B311		
3	½	15	B312		
4.7	½	15	B313		
10	½	15	B315		
14	½	15	B316		
4.7	¾	20	B317		
7.4	¾	20	B318		
14	¾	20	B320		
24	¾	20	B321		
7.4	1	25	B322		
10	1	25	B323		
30	1	25	B325*		
10	1¼	32	B329	AR Series, AR...N4 Series	AF Series
19	1¼	32	B330		
25	1¼	32	B331		
19	1½	40	B338		
29	1½	40	B339		
37	1½	40	B340		
46	1½	40	B341		
29	2	50	B347		
37	2	50	B348		
46	2	50	B349		
57	2	50	B350		
68	2	50	B351		
83	2	50	B352		

*Models without characterizing disc

Flow Patterns



LR...24-SR Actuators, Proportional

Models

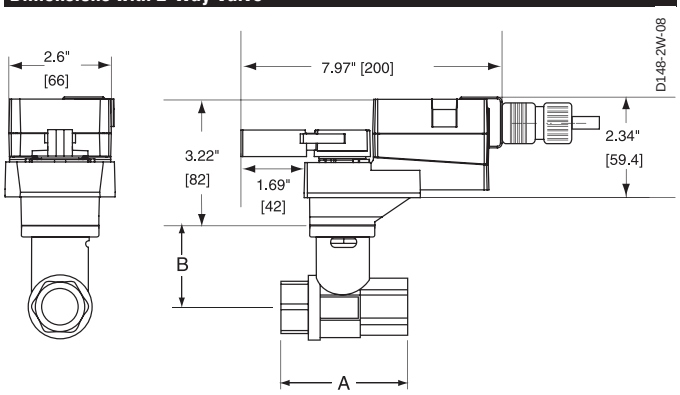
LRB24-SR-T	LRX24-SR-T	w/Terminal Block
LRB24-SR	LRX24-SR	w/3ft. cable

Technical Data	
Power supply	24 VAC ± 20% 50/60 Hz 24 VDC ± 10%
Power consumption running	1.5 W
holding	0.4 W
Transformer sizing	3 VA (class 2 power source)
Electrical connection	½" conduit connector 18 GA, plenum rated cable
LRB24-SR	3 ft [1m]
LRX24-SR	3 ft [1m], 10 ft [3m], 16 ft [5m]
Overload protection	electronic throughout 0° to 95° rotation
Operating range Y	2 to 10 VDC, 4 to 20 mA
Feedback output U	1 to 10 VDC, max 0.5 mA
Input impedance	100 kΩ (0.1 mA), 500 Ω
Angle of rotation	90°, adjustable with mechanical stop
Direction of rotation	reversible with protected ↷/↶ switch
Position indication	handle
Manual override	external push button
Running time	constant independent of load
LRB24-SR	90 seconds
LRX24-SR	150, 95, 60, 45, 35 seconds
Humidity	5 to 95% RH non-condensing (EN 60730-1)
Ambient temperature	-22°F to 122°F [-30°C to 50°C]
Storage temperature	-40°F to 176°F [-40°C to 80°C]
Housing	NEMA 2/IP54
Housing material	UL94-5VA
Agency listings†	cULus according to UL 60730-1A/-2-14, CAN/CSA E60730-1:02, CE according to 2004/108/EC and 2006/95/EC for line voltage and/or –S versions
Noise level	<35 dB(A)
Quality standard	ISO 9001

LR...24-SR-T	
Electrical connection	screw terminal (for 26 to 14 GA wire) protected (NEMA 2/IP20)

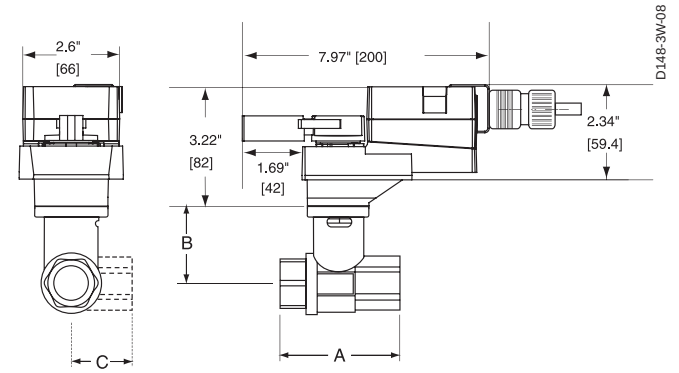
† Rated impulse voltage 800V, Control pollution degree 3, Type of action 1
(1.B for -S models)

Dimensions with 2-Way Valve



	Valve Nominal Size		Dimensions (Inches [mm])	
Valve Body	Inches	DN [mm]	A	B
B207(B)-B211(B)	½"	15	2.41" [61.1]	1.39" [35.2]
B212(B)-B215(B)	½"	15	2.38" [60.4]	1.78" [45.2]
B217(B)-B221(B)	¾"	20	2.73" [69.3]	1.87" [47.4]
B222-B225	1"	25	3.09" [78.4]	1.87" [47.4]
B229-B231	1¼"	32	3.72" [94.6]	1.87" [47.4]

Dimensions with 3-Way Valve



	Valve Nominal Size		Dimensions (Inches [mm])		
Valve Body	Inches	DN [mm]	A	B	C
B307(B)-B311(B)	½"	15	2.06" [52.2]	1.39" [35.2]	1.20" [30.6]
B312(B)-B315(B)	½"	15	2.38" [60.4]	1.78" [45.2]	1.29" [32.8]
B317(B)-B321(B)	¾"	20	2.73" [69.3]	1.87" [47.4]	1.47" [37.3]
B322-B325	1"	25	3.09" [78.4]	1.87" [47.4]	1.59" [40.3]

Wiring Diagrams

INSTALLATION NOTES

△2 ***CAUTION** Equipment damage!*
Actuators may be connected in parallel.
Power consumption and input impedance must be observed.

△3 Actuators may also be powered by 24 VDC.

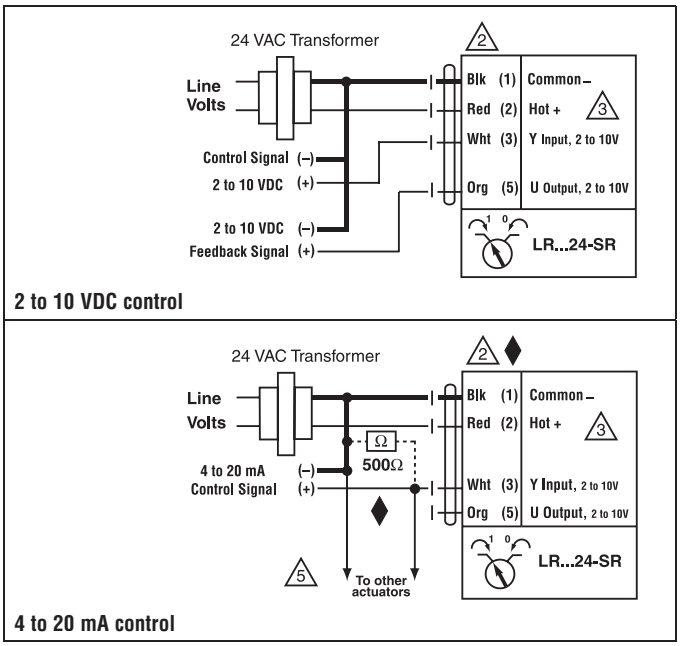
△5 Only connect common to neg. (–) leg of control circuits.

APPLICATION NOTES

♦ Meets cULus or UL and CSA requirements without the need of an electrical ground connection.

♦ The ZG-R01 500 Ω resistor converts the 4 to 20 mA control signal to 2 to 10 VDC, up to 2 actuators may be connected in parallel.

⚠ ***WARNING** Live Electrical Components!*
During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.



2 to 10 VDC control

4 to 20 mA control

B3 Series, Three Way, Characterized Control Valve
Stainless Steel Ball and Stem

Application

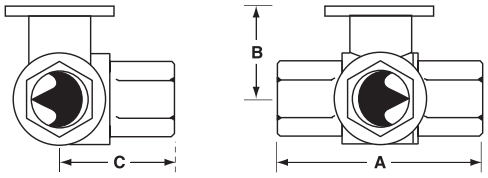
This valve is typically used in air handling units on heating or cooling coils, and fan coil unit heating or cooling coils. Some other common applications include Unit Ventilators, VAV box re-heat coils and bypass loops. This valve is suitable for use in a hydronic system with variable or constant flow.

Technical Data

Service	chilled or hot water, 60% glycol
Flow characteristic	A-port equal percentage B-port modified for constant common port flow
Controllable Flow Range	75°
Sizes	½", ¾", 1", 1¼", 1½", 2"
Type of end fitting	NPT female ends
Materials:	
Body	forged brass, nickel plated
Ball	stainless steel
Stem	stainless steel
Seats	PTFE
Characterizing disc	Tefzel®
Packing	2 EPDM O-rings, lubricated
Body pressure rating	
600 psi	½" - 1"
400 psi	1¼" - 2"
Media temp. range	0°F to 250°F [-18°C to 120°C]
Close off pressure	
200 psi	½" - 2"
Maximum differential pressure (ΔP)	50 psi for typical applications
Leakage	0% for A to AB <2.0% for B to AB
External leakage	according to EN 12266-1:2003
C_v rating	A-port: see product chart for values B-port: 70% of A to AB C_v

Tefzel® is a registered trademark of DuPont

Dimensions



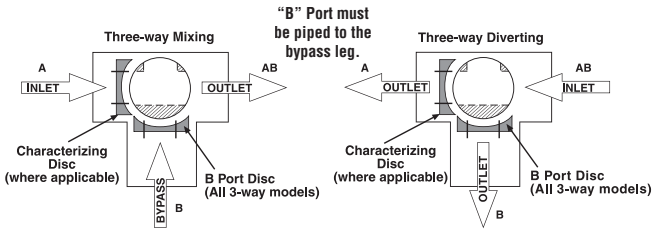
3WayValve-B307-B320

Valve Body	Valve Nominal Size Inches	DN [mm]	Dimensions (Inches [mm]) A	B	C
B307-B311	½"	15	2.41" [61.1]	1.39" [35.2]	1.20" [30.6]
B312-B316	½"	15	2.38" [60.4]	1.78" [45.2]	1.29" [32.8]
B317-B321	¾"	20	2.73" [69.3]	1.87" [47.4]	1.47" [37.3]
B322-B325	1"	25	3.09" [78.4]	1.87" [47.4]	1.59" [40.3]
B329-B331	1¼"	32	3.96" [100.6]	2.27" [57.7]	2.14" [54.3]
B338-B341	1½"	40	4.39" [111.6]	2.51" [63.7]	2.40" [61.1]
B347-B352	2"	50	4.90" [124.5]	2.73" [69.5]	2.74" [69.7]

C_v	Valve Nominal Size Inches	DN [mm]	Type 3-Way NPT	Suitable Actuators Non-Spring	Spring
0.3	½	15	B307	TR Series, LR Series, NR...N4 Series	TF Series, LF Series
0.46	½	15	B308		
0.8	½	15	B309		
1.2	½	15	B310		
1.9	½	15	B311		
3	½	15	B312		
4.7	½	15	B313		
10	½	15	B315		
14	½	15	B316		
4.7	¾	20	B317		
7.4	¾	20	B318		
14	¾	20	B320		
24	¾	20	B321		
7.4	1	25	B322		
10	1	25	B323		
30	1	25	B325*		
10	1¼	32	B329	AR Series, AR...N4 Series	AF Series
19	1¼	32	B330		
25	1¼	32	B331		
19	1½	40	B338		
29	1½	40	B339		
37	1½	40	B340		
46	1½	40	B341		
29	2	50	B347		
37	2	50	B348		
46	2	50	B349		
57	2	50	B350		
68	2	50	B351		
83	2	50	B352		

*Models without characterizing disc

Flow Patterns



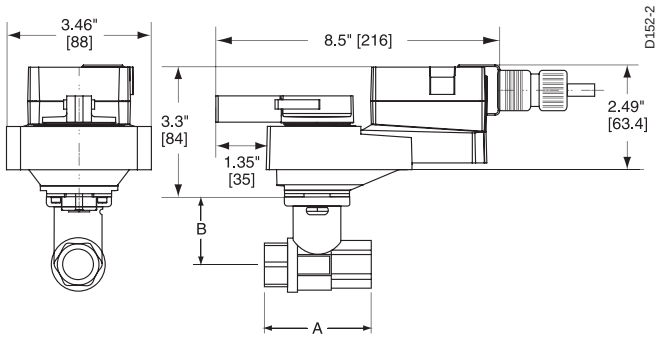
Models

ARB24-SR
ARX24-SR Flexible Version

Technical Data	
Power supply	24 VAC ± 20% 50/60 Hz 24 VDC ± 10%
Power consumption running	2.5 W
holding	0.4 W
Transformer sizing	5 VA (class 2 power source)
Electrical connection	½" conduit connector 18 GA plenum rated cable 3 ft [1m], 10 ft [3m], 16 ft [5m]
Overload protection	electronic throughout 0° to 95° rotation
Operating range Y	2 to 10 VDC, 4 to 20 mA
Feedback output U	1 to 10 VDC, max 0.5 mA
Input impedance	100 kΩ (0.1 mA), 500 Ω
Angle of rotation	90°, adjustable with mechanical stop
Torque	180 in-lb [20 Nm]
Direction of rotation	reversible with protected ↷/↶ switch
Position indication	handle
Manual override	external push button
Running time ARB24-SR... ARX24-SR...	 90 seconds 300, 150, 90 seconds, constant independent of load
Humidity	5 to 95% RH non-condensing (EN 60730-1)
Ambient temperature	-22°F to +122°F [-30°C to +50°C]
Storage temperature	-40°F to +176°F [-40°C to +80°C]
Housing	NEMA 2/IP54
Housing material	UL94-5VA
Agency listings†	cULus according to UL 60730-1A/-2-14, CAN/CSA E60730-1:02, CE according to 2004/108/EC and 2006/95/EC for line voltage and/or –S versions
Noise level	<45 dB(A)
Quality standard	ISO 9001

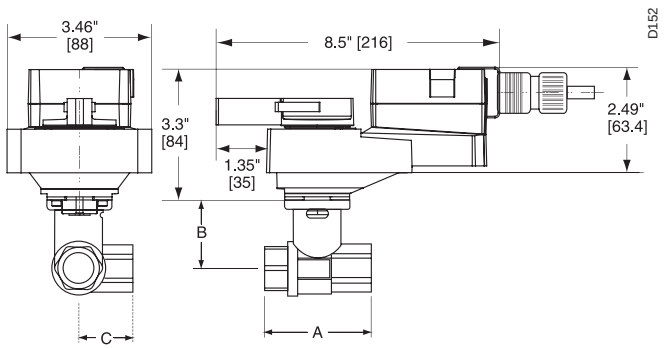
† Rated impulse voltage 800V, Control pollution degree 3, Type of action 1 (1.B for -S models)

Dimensions with 2-Way Valve



	Valve Nominal Size		Dimensions (Inches [mm])	
Valve Body	Inches	DN [mm]	A	B
B231-B232	1¼"	32	3.72" [94.6]	2.04" [51.9]
B238-B240	1½"	40	3.88" [98.5]	2.04" [51.9]
B248-B250	2"	50	4.21" [107.0]	2.27" [57.7]

Dimensions with 3-Way Valve



	Valve Nominal Size		Dimensions (Inches [mm])		
Valve Body	Inches	DN [mm]	A	B	C
B329-B331	1¼"	32	3.96" [100.6]	2.27" [57.7]	2.14" [54.3]
B338-B341	1½"	40	4.39" [111.6]	2.51" [63.7]	2.40" [61.1]
B347-B352	2"	50	4.90" [124.5]	2.73" [69.5]	2.74" [69.7]

Wiring Diagrams

INSTALLATION NOTES

△2 ***CAUTION** Equipment damage!*
Actuators may be connected in parallel.
Power consumption and input impedance must be observed.

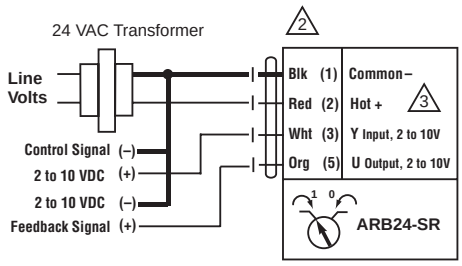
△3 Actuators may also be powered by 24 VDC.

△5 Only connect common to neg. (–) leg of control circuits.

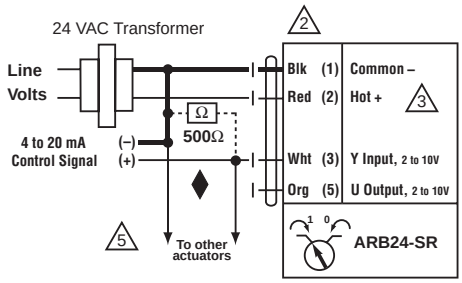
APPLICATION NOTES

◆ The ZG-R01 500 Ω resistor converts the 4 to 20 mA control signal to 2 to 10 VDC, up to 2 actuators may be connected in parallel.

***WARNING** Live Electrical Components!*
During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.



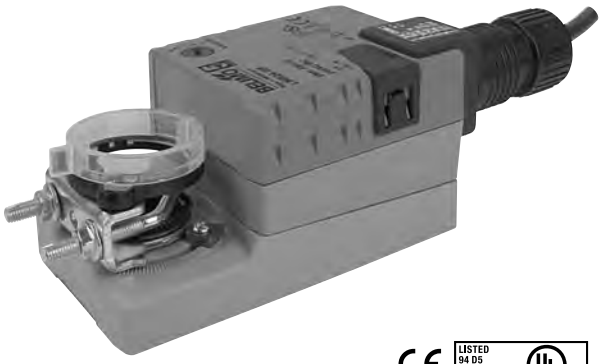
2 to 10 VDC control



4 to 20 mA control

LMB(X)24-SR(-T)

Proportional, Non-Spring Return, 24 V, for 2 to 10 VDC or 4 to 20 mA



Torque min. 45 in-lb for control of damper surfaces up to 11 sq ft.

Models

LMB24-SR/LMX24-SR **LMB24-SR.1 (bulk)**
LMB24-SR-T/LMX24-SR-T **LMB24-SR-T.1 (bulk)**

Application

For proportional modulation of dampers in HVAC systems. Actuator sizing should be done in accordance with the damper manufacturer's specifications.

The actuator is mounted directly to a damper shaft from 1/4" up to 5/8" in diameter by means of its universal clamp. Shafts up to 3/4" diameter can be accommodated by an accessory clamp.

The actuator operates in response to a 2 to 10 VDC, or with the addition of a 500 Ω resistor, a 4 to 20 mA control input from an electronic controller or positioner. A 2 to 10 VDC feedback signal is provided for position indication or master-slave applications.

Operation

The actuator is not provided with and does not require any limit switches, but is electronically protected against overload. The anti-rotation strap supplied with the actuator will prevent lateral movement.

The LMB series provides 95° of rotation and a visual indicator indicates position of the actuator. When reaching the damper or actuator end position, the actuator automatically stops. The gears can be manually disengaged with a button on the actuator cover.

The LMB24-SR… actuators use a sensorless brushless DC motor, which is controlled by an Application Specific Integrated Circuit (ASIC). The ASIC monitors and controls the actuator's rotation and provides a digital rotation sensing (DRS) function to prevent damage to the actuator in a stall condition. Power consumption is reduced in holding mode.

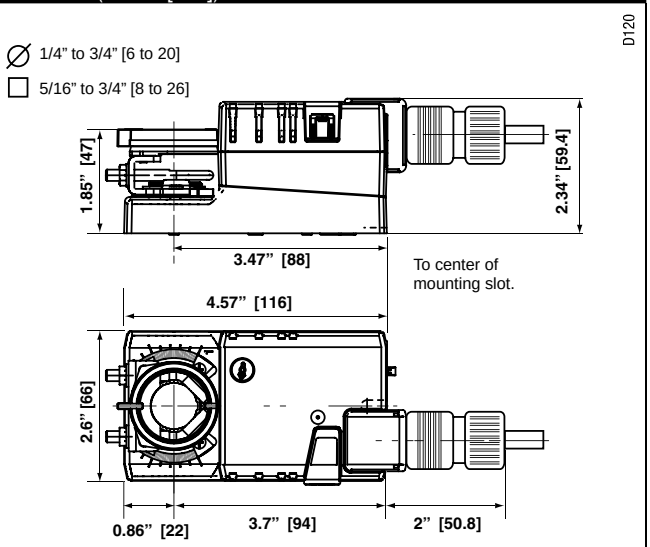
Add-on auxiliary switches or feedback potentiometers are easily fastened directly onto the actuator body for signaling and switching functions.

Technical Data	LMB(X)24-SR(-T)
Power supply	24 VAC ± 20% 50/60 Hz 24 VDC ± 10%
Power consumption	1.5 W (0.4 W)
Transformer sizing	3 VA (Class 2 power source)
Electrical connection	3 ft, 18 GA plenum rated cable 1/2" conduit connector protected NEMA 2 (IP54) 3 ft [1m] 10 ft [3m] 16 ft [5m]
Overload protection	electronic throughout 0 to 95° rotation
Operating range Y	2 to 10 VDC, 4 to 20 mA
Input impedance	100 kΩ (0.1 mA), 500 Ω
Feedback output U	2 to 10 VDC (max 0.5 mA)
Angle of rotation	max. 95°, adjustable with mechanical stop
Torque	45 in-lb [5 Nm]
Direction of rotation	reversible with ↷/↶ switch actuator will move: ↶ =CCW with decreasing control signal (10 to 2V) ↷ =CW with decreasing control signal (10 to 2V)
Position indication	reflective visual indicator (snap-on)
Manual override	external push button
Running time	95 seconds, constant independent of load
Humidity	5 to 95% RH non condensing (EN 60730-1)
Ambient temperature	-22°F to 122°F [-30°C to 50°C]
Storage temperature	-40°F to 176°F [-40°C to 80°C]
Housing	NEMA 2, IP54, UL enclosure type 2
Housing material	UL94-5VA
Agency listings†	cULus acc. to UL 60730-1A/-2-14, CAN/CSA E60730-1:02, CE acc. to 2004/108/EEC and 2006/95/EC
Noise level	<35dB(A)
Servicing	maintenance free
Quality standard	ISO 9001
Weight	1.7 lbs [0.5 kg]

LMB(X)24-SR-T	
Electrical connection	screw terminal (for 26 to 14 GA wire)
Housing	unprotected (NEMA 1/IP20) protected (NEMA 2/IP20) use ZS-T

†Rated Impulse Voltage 800V, Type of action 1, Control Pollution Degree 3.

Dimensions (Inches [mm])



Accessories

K-LM20	3/4" [20 mm] Shaft Clamp
AV6-20	Shaft Extension
ZG-LMSA	Shaft Adaptor for 1/2" Diameter Shafts
ZG-LMSA-1	Shaft Adaptor for 3/8" Diameter Shafts
ZS-T	Terminal Cover for NEMA 2
ZS-100	Weather Shield - Steel
ZS-150	Weather Shield - Polycarbonate
Tool-06	8 mm & 10 mm Wrench
S1A, S2A	Auxiliary Switch(es)
P370	Shaft Mount Auxiliary Switch
P…A	Feedback Potentiometers
SGA24	Min positioners in NEMA 4 housing
SGF24	Min positioners for flush panel mounting
PTA-250	Pulse Width Modulation Interface
IRM-100	Input Rescaling Module
ADS-100	Analog to Digital Switch
ZG-R01	Resistor for 4 to 20 mA Conversion
NSV24 US	Battery Back-Up Module
ZG-X40	Transformer

NOTE: When using LMB(X)24-SR… actuators, only use accessories listed on this page.

Typical Specification

Proportional control damper actuators shall be electronic direct-coupled type, which require no crank arm and linkage and be capable of direct mounting to a shaft from 1/4" to 5/8". Shafts up to 3/4" diameter can be accommodate with an accessory clamp. Actuators must provide proportional damper control in response to a 2 to 10 VDC or, with the addition of a 500 Ω resistor, a 4 to 20 mA control input from an electronic controller or positioner. Actuators shall have brushless DC motor technology and be protected from overload at all angles of rotation. Actuators shall have reversing switch and manual override on the cover. If required, actuator will be provided with screw terminal strip for electrical connections (LMB24-SR-T). Run time shall be constant and independent of torque. A 2 to 10 VDC feedback signal shall be provided for position indication. Actuators shall be cULus listed, have a 5-year warranty, and be manufactured under ISO 9001 International Quality Control Standards. Actuators shall be as manufactured by Belimo.

Wiring Diagrams

INSTALLATION NOTES

1 Provide overload protection and disconnect as required.

2 ***CAUTION** Equipment Damage!*
Actuators may be connected in parallel.
Power consumption and input impedance must be observed.

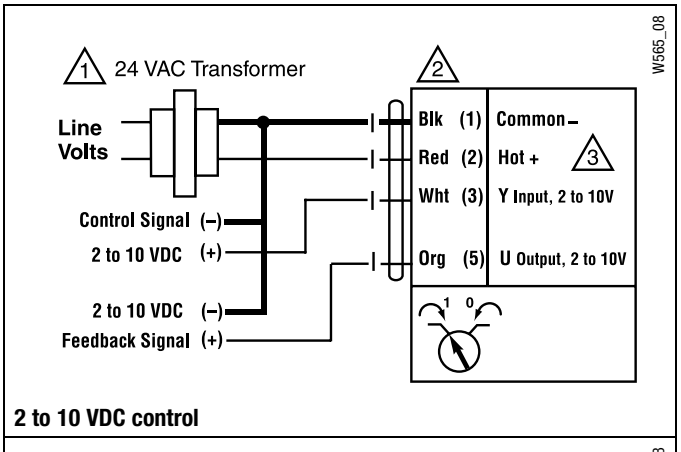
3 Actuators may also be powered by 24 VDC.

5 Only connect common to neg. (–) leg of control circuits.

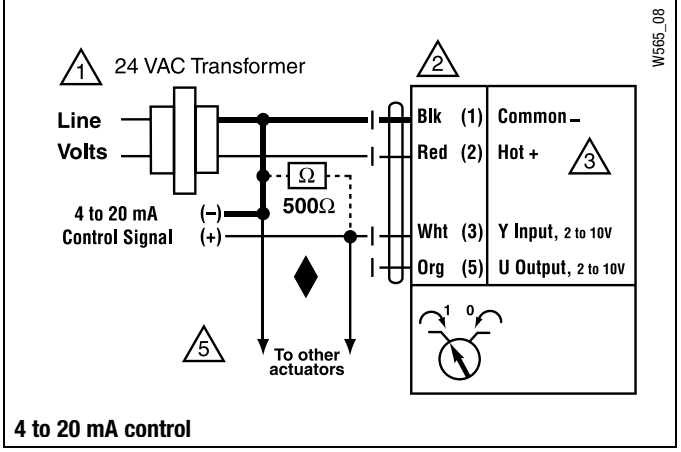
APPLICATION NOTES

The ZG-R01 500 Ω resistor converts the 4 to 20 mA control signal to 2 to 10 VDC, up to 2 actuators may be connected in parallel.

***WARNING** Live Electrical Components!*
During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.



2 to 10 VDC control



4 to 20 mA control

AIR PRESSURE SENSORS, SURGE DAMPENERS

A300 SERIES, RPS, SD-01, 21121, 60681

DESCRIPTION

Static Pressure Sensors
The **A-300-K Series** sensors are used with pressure transmitters and pressure switches to sense duct pressures. Two sensors are required to monitor pressure across coils, filters, blowers, etc. **A-301-K** and **A-302-K** have four radial sensing holes and 4" (10.2 cm) insertion depth. The **A-308-K** should be used only where accuracy is not critical. All mount in a 3/8" hole in the duct. If the interior of the duct is not accessible, an optional **A-345-K** flange mounting kit may be used.

Room Static Pressure or Total Pressure Sensor Kit
The versatile **Model 60681** Pressure Sensing Kit is used for monitoring static pressure (aspiration) or total pressure (impact). The kit includes a 7" (17.8 cm) universal sensing probe, adjustable mounting flange, 1/4" adapter, and 3' (0.9 m) length of tubing (1/4" ID x 3/8" OD). For total (impact) pressure applications, install the curved tip opening facing into the air stream or away from the air stream for vacuum applications.

Total Pressure Sensor
The **Model 21122 (4")** and **21123 (8")** sensors are used primarily for proving air flow in ducts. The opening in the tip of the 4" (10.2 cm) aluminum tube faces upstream and senses impact (total) pressure. The "-112" models accept 1/8" to 1/4" ID flexible tubing.

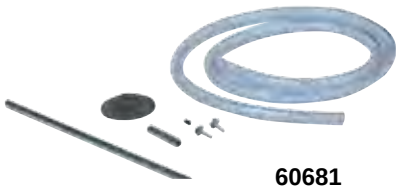
Outdoor Static Pressure Sensor
The **A-306-K** Outdoor Static Pressure Sensor provides an outdoor pressure signal for reference in building pressurization applications. The **A-306-K** includes the sensor, 50' (15.24m) of vinyl tubing, mounting bracket, and hardware.

Room Static Pressure Sensor
The **Model RPS** is a stainless steel, wall-mounted room static pressure sensor. It mounts directly to the wall or to a standard electrical box. The **Model RPS-W** is a white plastic, wall-mounted room static pressure sensor, and the **Model RPS-I** is ivory. The RPS sensors have a 100 micron stainless steel breather vent.

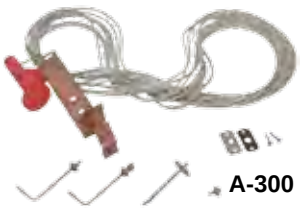
Filter Kit
The Model **A-605** Filter Kit includes an aluminum surface mounting bracket and screws, two 5 ft lengths of 1/4" aluminum tubing, two static pressure tips, and two plastic vent valves.

Surge Dampener
Surge Dampener **Model SD-01** absorbs rapid pressure fluctuations to provide steady pressure outputs. The dampener has two independent channels - one for the low pressure tubing and one for the high pressure tubing. Surge dampeners are typically used with outdoor pressure sensors, which are subject to wind gusts, and isolation rooms, clean rooms, or operating rooms where opening or closing doors creates sudden pressure changes.

RPS-W



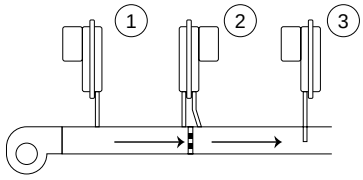
60681



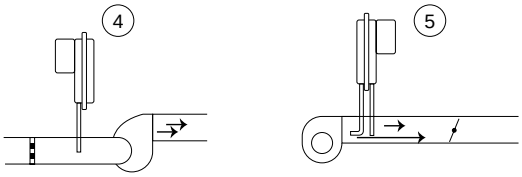
A-300 Series

RPS & SD-01

APPLICATION



1. Positive static pressure increases as the filter gets dirty.
2. Differential across filter changes as filter gets dirty.
3. Flow is reduced as filter gets dirty.



4. Negative pressure increases as the filter gets dirty.
5. Fan operation and true air flow: varying amounts of static pressure. Probes must be perpendicular to air flow.

ORDERING INFORMATION

MODEL	DESCRIPTION
60681	Static or total pressure sensing kit
A-301-K	Duct static pressure tip, 1/4" compression
A-302-K	Duct static pressure tip, 1/4" barb
A-308-K	Duct static pressure fitting, 1/4" barb
A-345-K	Flange mounting kit (1 required for each A-301-K or A-302-K)
A-3145K	A-301-K duct static pressure tip, 1/4" compression with A-345-K mounting flange
A-3245K	A-302-K duct static pressure tip, 1/4" barb with A-345-K mounting flange
A-3845K	A-308-K duct static pressure fitting, 1/4" barb with A-345-K mounting flange
21122	4" aluminum impact tube, 1/4" OD connection
21122-112	6" aluminum impact tube for 1/8" thru 1/4" ID flexible plastic tubing
21123	8" aluminum impact tube, 1/4" OD connection
21123-112	8" aluminum impact tube for 1/8" thru 1/4" ID flexible plastic tubing
A-306-K	Outdoor air static pressure kit
A-605	Mounting kit for air filter application. Includes aluminum surface mounting brackets with screws, two 5 ft. lengths of 1/4" aluminum tubing, two static pressure tips and two plastic vent valves.
RPS	Stainless steel room pressure sensor, 1/4" barb
RPS-I	Ivory plastic room pressure sensor, 1/4" barb
RPS-W	White plastic room pressure sensor, 1/4" barb
SD-01	Surge dampener
B-137	1/4" barb adapter for #21122 and #21123 (standard pack-50)

DIFFERENTIAL PRESSURE SWITCH

24-013, 24-014

UNITED ELECTRIC CONTROLS

DESCRIPTION

The **Delta-Pro Models 24-013** and **24-014 NEMA 4 Differential Pressure Switches** offer a unique blend of small size, excellent performance, environmental protection, and attractive price. They can be used with liquids or gases.

The precision snap-acting switch and sensitive opposing diaphragms combine to provide a narrow deadband and repeatability of approximately ±1% of span. Mechanical contact life is 10 million cycles, and actual switch life can be very long with typical pilot duty loads. The Delta-Pro NEMA 4 enclosure is small, yet it can still accommodate a 1/2" NPT conduit connection and terminal block wiring.

The Delta-Pro is not only lightweight but also strong and durable. The multiturn adjustment screw is externally accessible for convenience and excellent resolution. The Delta-Pro's force-balance design provides excellent vibration resistance.

MADE IN USA

24-013

FEATURES

- ***SPDT switch with screw terminals***
- ***Gasketed zinc-plated steel cover***
- ***Strong, corrosion-resistant polyester enclosure***
- ***External, multiturn adjusting screw for excellent resolution***
- ***7/8" hole for 1/2" NPT conduit connection***
- ***Corrosion-resistant brass port***
- ***Front accessible holes for surface mounting***
- ***NEMA 4 enclosure***

APPLICATION

Models 24-013 and **24-014** are used typically to sense differential pressure across devices such as oil or water filters, pumps, heat exchangers, chillers, coils, etc. They normally provide an alarm or shutdown function in applications where there is insufficient flow in a system or when excessive pressure differential indicates a problem. They may also be used to indicate pump status.

SPECIFICATIONS

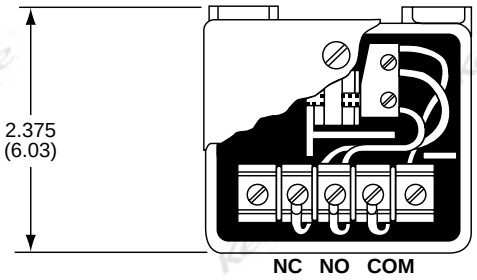
Contact Rating	5A resistive and inductive @ 125 VAC and 250 VAC, 1/4 hp 5A resistive and 3A inductive @ 30 VDC 0.5A resistive and 0.25A inductive @ 125 VDC gold clad silver contacts for minimum loads of 5 mA @ 6 VDC, 2 mA @ 12 VDC, and 1 mA @ 24 VDC
Contact Type	SPDT
Adjustments	Multiturn screw, accessible from outside enclosure
Repeatability	Typically ±1% of span
Overpressure	150 psid (1034.3 kPa) with surges up to 160°F (71°C) air temp, without loss of adjustability
Operating Pressure	0-150 psig (0-1034.3 kPa) up to 160°F (71°C) air temp
Life Expectancy	10 million cycles (actual life depends on load and cycle frequency)
Shock	15G, 10 ms duration
Vibration Resistance	MIL STD 810C, 2.5G, 5-500 CPS
Operating Temperature	30° to 160°F (-1° to 71°C)
Wetted Parts	Polyurethane diaphragm, ethylene propylene, polysulphone, brass
Media Temperature Range	200°F (93°C) @ 100 psig (689.5 kPa) working pressure
Storage Temperature	-20° to 180°F (-29° to 82°C)
Enclosure Rating	Reinforced nylon body, zinc-plated steel cover with neoprene gasket, NEMA 4
Mounting	Surface mount with two screws through clearance holes or mount by ports
Process Connection	1/4" FNPT brass
Wiring Terminations	7/8" hole for 1/2" conduit connector (not provided), three screw terminals 16 AWG max wire size
Approvals	UL File E42272, CSA, CE
Weight	1 lb (0.45 kg)
Warranty	1 year

DIFFERENTIAL PRESSURE SWITCH

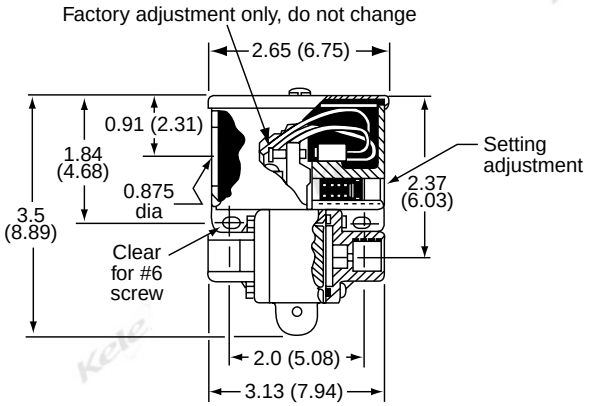
24-013, 24-014

DIMENSIONS

in
(cm)



Top View



INSTALLATION

Mounting
Mount unit in any position. Locate where shock and vibration are minimal and ambient temperature is below 160°F (71°C).

Surface mounting
Insert two #6 screws through holes on 2" (5.08 cm) centers (recommended mounting for maximum vibration resistance).

Suspended unit mounting
Mount unit from its two ports. Always hold a wrench on the pressure port when making pressure connection.

Making pressure connection
Connect the high side pressure to the port labeled high. Use a wrench on the pressure port and hold the unit steady. Then, thread a 1/4 NPTM fitting into the port.

CAUTION: Never tighten by turning the switch body into the fitting.

Wiring
Back out the screw terminal just enough to put stripped wire under this terminal block clamp. Maximum wire size is 16 AWG.

Setpoint adjustment
Use a screwdriver to turn the external adjusting screw. Turn "in" (clockwise) to increase differential pressure setting. For best setting accuracy, set the switch using the actual working pressures encountered in the application. The switch will make on a differential pressure rise to setpoint and break on a fall below setpoint minus the deadband (subtractive deadband).

PERFORMANCE CHART

MODEL*	ADJUSTABLE SETTING RANGE psid (kPa)				PORT	SWITCH	DEADBAND psig (kPa)
	On fall		On rise				
	Minimum	Maximum	Minimum	Maximum			
24-013	1.0 (6.895 kPa)	9.0 (62.1 kPa)	2.0 (13.8 kPa)	10.0 (69.0 kPa)	1/4 FNPT	5A	0.75 (5.2)
24-014	4.0 (27.6 kPa)	43.5 (299.9 kPa)	5.5 (37.9 kPa)	45.0 (310.3 kPa)	Brass	5A	1.0 (6.9)

* Add the suffix **-C** to have the unit precalibrated. Please specify the setpoint.

ORDERING INFORMATION

MODEL	DESCRIPTION
24-013	Differential pressure switch 1-10 psi SPDT
24-013-C	Differential pressure switch 1-10 psi SPDT, custom calibrated
24-014	Differential pressure switch 4-45 psi SPDT
24-014-C	Differential pressure switch 4-45 psi SPDT, custom calibrated

HUMIDITY

DEW POINT, ENTHALPY & WET BULB TRANSMITTERS

DP4A, EN4A, WB4A

DESCRIPTION

The **Telaire/Amphenol Advanced Sensors Model DP4 Dew Point, WB4 Wet Bulb, and EN4 Enthalpy Transmitters** are rugged, compact, and ideally suited for monitoring dew point, wet bulb, or enthalpy in commercial HVAC/BAS applications. Using a capacitive RH sensor and an RTD temperature sensor, the unit's microprocessor computes the dew point, wet bulb, or enthalpy. Two linear outputs provide a 4-20mA signal for dew point, wet bulb, or enthalpy, and a 4-20 mA signal for dry bulb. temperature.

FEATURES

- ***Dew point accuracy of ±1.8°F (±1°C) over the specified range***
- ***Enthalpy accuracy of ±2 BTU/lb over specified range***
- ***Wet bulb accuracy of ±3°F over the specified range***
- ***Dry bulb accuracy of ±.05°F (±0.9°C)over the specified range***
- ***Two 4-20 mA output signals***
- ***Microprocessor-based signal processing***
- ***Weather resistant duct/OSA mounting***
- ***Temperature compensated***

APPLICATIONS

- ***DP4 supply air setpoint (condensation prevention)***
- ***EN4 economizer efficiency***
- ***WB4 evaporative cooling decision potential***

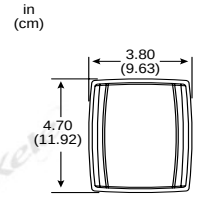
SPECIFICATIONS

Accuracy	
Enthalpy	±2 BTU/lb
Dew Point	±1.8°F (±1°C)
Wet Bulb	±3.24°F (±1.8°C)
Dry Bulb	±0.5°F (±0.9°C)
Supply Voltage	12-30 VDC, 100 mA
Signal Output	Field selectable: 4-20 mA (700Ω max load), 0-5 V, or 0-10 V Humidity and dry bulb temperature
Measurement Range	
Dew Point	
Duct/OSA	-20° to 120°F (-28.8° to 49°C)
Space	40° to 90°F (4.4° to 32.2°C)
Enthalpy	
Space/Duct/OSA	0-50 BTU/lb
Wet Bulb	
Duct/OSA	0° to 100°F (-17.8° to 37.8°C)
Space	40° to 90°F (4.4° to 32.2°C)
Dry Bulb	
Duct/OSA	-20° to 120°F (-28.8° to 49°C)
Space	40° to 90°F (4.4° to 32.2°C)
Sensing Technology	Capacitive and replaceable
Operating Temperature	-40° to 140°F (-40° to 60°C)
Operating Humidity	0 to 99% RH, non-condensing
Aprrovals	CE, RoHs
Weight	
Room	0.34 lb (0.15 Kg)
Duct	0.96 lb (0.44 Kg)
OSA	1.22 lb (0.55 Kg)
Warranty	1 year

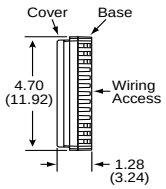
DEW POINT, ENTHALPY & WET BULB TRANSMITTERS

DP4A, EN4A, WB4A

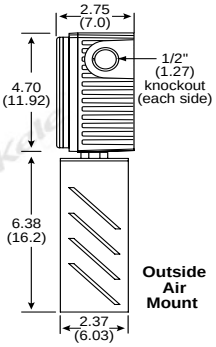
DIMENSIONS



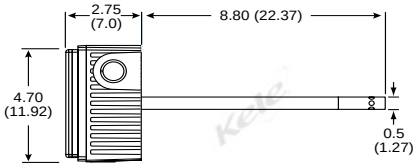
Cover (all mounts)



Space (Wall) Mount



Outside Air Mount



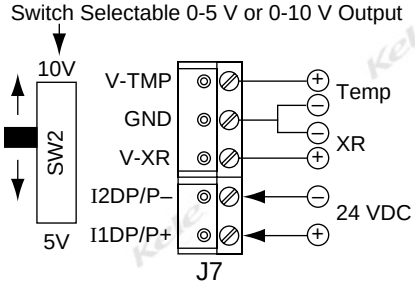
Duct Mount

WIRING

VOLTAGE MODE

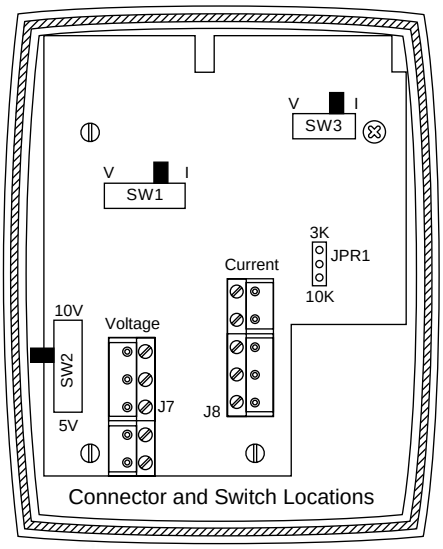
Switch Positions for Voltage Mode

Switch Selectable 0-5 V or 0-10 V Output



XR and Temperature - Voltage

*XR represents; DP - Dewpoint; EN-Enthalpy; WB - Wet bulb

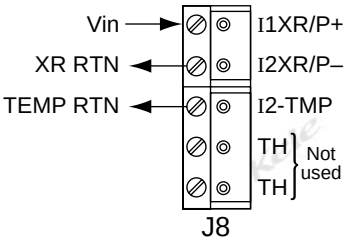


Connector and Switch Locations

Only one terminal block provided; move for either voltage or current.

CURRENT MODE

Switch Positions for Current Mode



XR and Temperature - Current Loop

ORDERING INFORMATION

MODEL	DESCRIPTION
EN4A-D	Duct enthalpy and dry bulb transmitter
EN4A-O	OSA enthalpy and dry bulb transmitter
DP4A-D	Duct dew point and dry bulb transmitter
EN4A-S	Room enthalpy and dry bulb transmitter
DP4A-O	OSA/Wall dew point and dry bulb transmitter
DP4A-S	Room dew point and dry bulb transmitter
WB4A-D	Duct wet bulb and dry bulb transmitter
WB4A-O	OSA wet bulb and dry bulb transmitter
WB4A-S	Room wet bulb and dry bulb transmitter

RELATED PRODUCTS

DCPA-1.2	Power supply, 120 VAC IN to 24 VAC/24 VDC OUT
DCP-1.5-W	Power supply, 24 VAC IN to 24 VDC OUT

DESCRIPTION

The **FXP Series** probe is a differential air pressure device designed to measure air velocities in a duct. It includes multiple sensing points to measure total and static pressures. The **FXP Series** incorporates a unique design to amplify the differential pressure by approximately 2.5 times for accurate measurement of lower air velocities down to 200 fpm. It is easy to install and cost effective.

FEATURES

- ***Multiple sensing points for greater accuracy***
- ***Easy installation***
- ***Chamfered sensing points for consistent readings***
- ***2% accuracy***
- ***2.5X signal amplification***
- ***Accepts 1/4" OD tubing***

INSTALLATION

Check that the FXP probe size corresponds with the duct or terminal where it is installed.

The FXP probe is mounted in the duct by drilling a 1" diameter hole.

Check that the air flow direction in the duct corresponds with the arrow on the FXP probe.

For round ducts, install the FXP probe diagonally in the duct for best results. This equalizes both horizontal and vertical irregular air approach.

SIZING THE PRESSURE TRANSMITTER

- CFM - Cubic feet per minute (customer furnished)
- A - Area square feet (customer furnished)
- V - Velocity feet per minute (customer furnished)
- ΔP - Differential pressure in WC"

Use formula B to calculate the ΔP for transmitter

$$V(FPM) = \frac{CFM}{A}$$

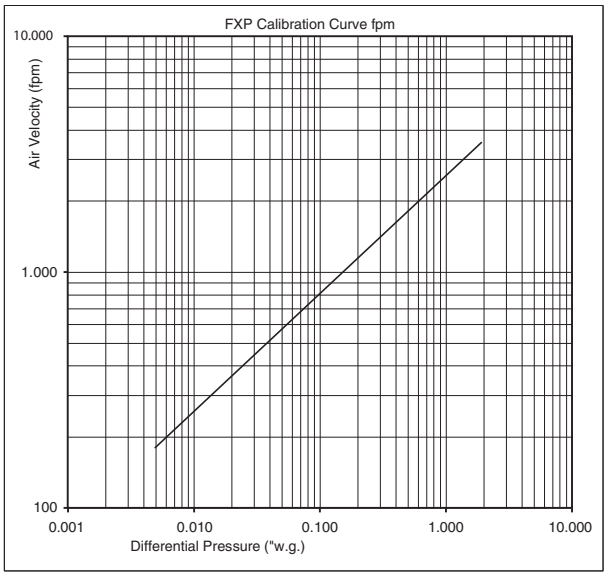
Formula A

$$\Delta P = \left[\frac{V}{Kv}\right]^2$$

Formula B

FXP Calibration Chart					
Size	**Kv**	**Size**	**Kv**	**Size**	**Kv**
4"	2225	**7"**	2450	**12"**	2500
5"	2325	**8"**	2480	**14"**	2525
6"	2400	**10"**	2440	**16"**	2550
18" and up			2550		

PERFORMANCE CHART



ORDERING INFORMATION

MODEL	DESCRIPTION	
FXP	FXP air velocity sensor	
	WIDTH	
	XX	Duct width (up to 48")

RELATED PRODUCTS

M30/40, T30/T40	**Modus differential pressure transmitter**
M264	**Setra differential pressure transmitter**
XLdp	**Ashcroft differential pressure transmitter**

HUMIDITY

3% HUMIDITY TRANSMITTER & OPTIONAL TEMPERATURE TRANSMITTERS

HD31K, HO31K, HW31K

DESCRIPTION

The **Kele Models HW31K, HD31K, and HO31K 3% humidity transmitters** are specifically designed for use in HVAC/BAS applications. These instruments measure relative humidity from 0% to 100%. The standard two-wire, 4-20 mA output provides low-cost humidity monitoring for building control. The RH transmitters are available with thermistor or RTD temperature sensors. They are available in room, duct, and OSA mounting styles.

OPERATION

The transmitter converts the relative humidity into a 4-20 mA signal with 3% accuracy. The optional temperature sensors, thermistor or RTD, offer direct connections to most automation systems.

HW31K

HD31K

HO31K

FEATURES

- ***3% accuracy (5% to 90% RH)***
- ***Two-wire, 4-20 mA output***
- ***White plastic design***

OPTIONS:

- ***Temperature thermistor***
- ***Temperature RTD***

SPECIFICATIONS

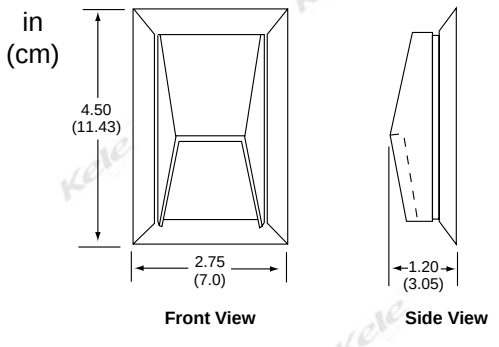
Accuracy	3% RH @ 73°F (23°C) from 5% to 90%; (0-5% & 90%-100%) add 4%
Thermal Effect	0.07% per °F
Stability	typically <±1% drift per year
Supply Voltage	9.5-28 VDC, loop powered
Signal Output	4-20 mA @ 725Ω, optional thermistor, RTD
Measurement Range	
RH	0-100%
Temperature	-20° to 140°F (29° to 60°C) (see ordering information)
Sensor Protection	HDPE FGX filter (duct and OSA)

Operating Temperature	-20° to 158°F (-29° to 70°C)
Operating Humidity	0-100% RH non-condensing
Enclosure Rating	NEMA 1, White plastic
Wiring Terminations	Screw terminals for loop termination
Weight	
Room	0.3 lb (0.09 Kg)
Duct	0.58 lb (0.26 Kg)
OSA	0.72 lb (0.33 Kg)
Approvals	RoHs
Warranty	1 year

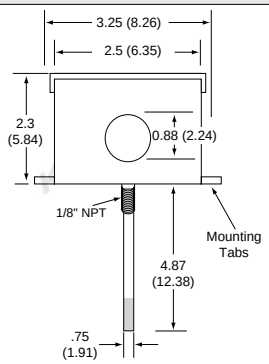
3% HUMIDITY TRANSMITTER & OPTIONAL TEMPERATURE TRANSMITTERS

HD31K, HO31K, HW31K

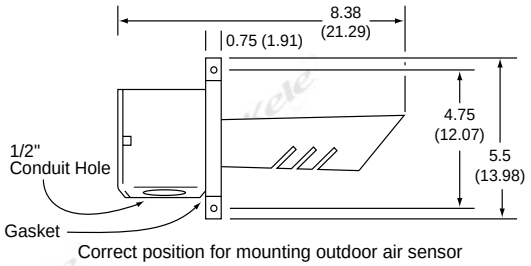
DIMENSIONS



HW31K



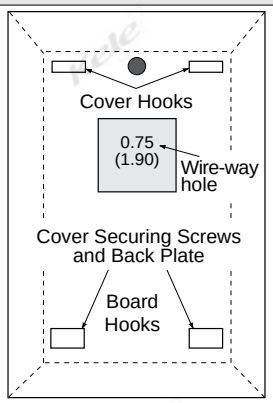
HD31K



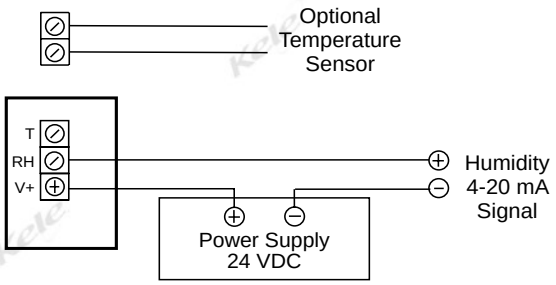
Correct position for mounting outdoor air sensor

HO31K

MOUNTING



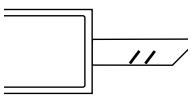
WIRING FOR ROOM UNIT



Room, HW31K (RH or RH-T)

MOUNTING OSA SENSOR

The transmitter should be mounted preferably on the north side (Northern Hemisphere) of a building under the eave, not above windows or doors. The transmitter should be mounted vertically with the sensor slots pointing down.



ORDERING INFORMATION

MODEL	DESCRIPTION
HW31K	3% room-mount humidity transmitter, 4-20 mA output
HD31K	3% duct-mount humidity transmitter, 4-20 mA output
HO31K	3% OSA-mount humidity transmitter, 4-20 mA output
	OPTIONS (temperature sensor or transmitter)
--	No temperature sensor
T3	10,000° thermistor @ 77°F (25°C), Type III
T11K	10,000° thermistor @ 77°F (25°C), Type III, with 11K shunt
T21	2252Ω thermistor @ 77˚F (25˚C), Type II
T22	3000Ω thermistor @ 77˚F (25˚C), Type II
T24	10,000° thermistor @ 77°F (25°C), Type II
T27	100,000Ω thermistor @ 77˚F (25˚C), Type II
T42	20,000Ω thermistor @ 77˚F (25˚C), Type IV
T63	1000Ω nickel RTD @ 70˚F (26˚C), Type III
T81	100Ω RTD @ 32˚F (0˚C), 385 platinum curve
T85	1000° @ 32˚F (0˚C), 385 platinum RTD
T91	1000° @ 32˚F (0˚C), 375 platinum RTD

HD31K – **T3**

Example: **HD31K-T3** Duct-mount humidity transmitter with 10 kΩ Type III temperature sensor

RELATED PRODUCTS

DCPA-1.2	Power supply, 120 VAC IN to 24 VAC/24 VDC OUT
DCP-1.5-W	Power supply, 24 VAC IN to 24 VDC OUT

DIFFERENTIAL PRESSURE SWITCHES

RFS-4001

DESCRIPTION

The **Cleveland Controls Models RFS-4001-025** and **RFS-4001-031 Differential Pressure Switches** are general-purpose, airflow-proving switches designed for HVAC and building automation applications. They may be used to sense positive, negative, or differential air pressure.

The plated housing contains a diaphragm, calibration spring and snap-acting switch. The **Model RFS-4001-025** pressure connections located on each side of the diaphragm, accept copper or flexible 1/4" OD tubing. The **Model RFS- 4001-031** has tri-barb connectors that accept 1/8", 1/4", and 5/16" ID flexible tubing. An enclosure cover guards against accidental contact with the live-switch terminal screws and the setpoint-adjusting screw. The enclosure will accept a 1/2" conduit connection.

RFS-4001-031

CLEVELAND CONTROLS

MADE IN USA

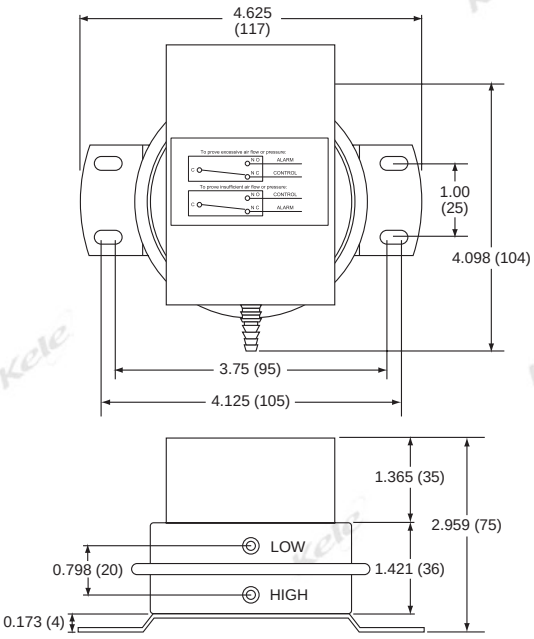
FEATURES

- ***Two-year warranty***
- ***Adjustable setpoint***
- ***Knockout for 1/2" conduit***
- ***Enclosed terminals***
- ***Compression or barb fittings***

SPECIFICATIONS

Contact Rating	300 VA pilot duty @ 115-277 VAC, 15A non-inductive to 277 VAC
Contact Type	SPDT
Setpoint Range	0.15" to 5.0" W.C. (37.3 to 1245 Pa)
Differential	Progressive, increasing from 0.05" W.C. at minimum setpoint to 0.3" W.C. at maximum setpoint
Overpressure	0.5 psig (3.5 kPa)
Life Expectancy	100,000 cycles minimum
Operating Temperature	-40° to 180°F (-40° to 82°C)
Mounting	Any vertical plane, avoid upward pressure connections
Process Connection	
RFS-4001-025	1/4" compression, suitable for use with 1/4" copper or plastic tubing
RFS-4001-031	Tri-barb connectors for 1/8", 1/4" and 5/16" ID tubing
Wiring Terminations	Screw terminals with cup washers
Approvals	UL File #MH6213, CSA
Weight	0.9 lb (0.4 kg)
Warranty	2 years

DIMENSIONS



ORDERING INFORMATION

MODEL	DESCRIPTION
RFS-4001-025	Differential pressure switch 0.15" to 5.0" W.C., 1/4" compression fittings
RFS-4001-025-C	Differential pressure switch 0.15" to 5.0" W.C., 1/4" compression fittings, custom calibrated
RFS-4001-031	Differential pressure switch 0.15" to 5.0" W.C., tri-barb fittings
RFS-4001-031-C	Differential pressure switch 0.15" to 5.0" W.C., tri-barb fittings, custom calibrated
RFS-4001-092	Differential pressure switch

RELATED PRODUCTS		PAGE
A-301-K	Duct static pressure tip, 1/4" compression	**1113**
A-302-K	Duct static pressure tip, 1/4" barb	**1113**
A-308-K	Duct static pressure fitting, 1/4" barb	**1113**
A-345-K	Flange mounting kit (1 required for each A-301-K or A-302-K)	**1113**
T-101	1/4" OD black poly tubing, 1 coil, 250 ft (76 m)	**901**

FUNCTIONAL DEVICES RELAY IN A BOX

RIB, RIBT POWER SERIES

DESCRIPTION

The **Functional Devices Relay In a Box (RIB) Power Series** controls most BAS, HVAC, low-horsepower motor and lighting applications. The relays come mounted and pre-wired in a housing, saving the installer the time, trouble and expense of buying separate components (relay, socket, mounting rail, and enclosure) and assembling them on the job or at the shop.

The **RIB Power Series** has a protruding 1/2" or 3/4" NPT nipple from which all wires exit (except **T series**). To install, remove a conduit knockout in the equipment, insert the wires and nipple through the hole, tighten the locknut, and connect the wires.

RIB Power Series - 20, 30A Relays

The **RIB Power Series** has relay contacts rated for 20 and 30A. They require modest coil drive current and are used for direct switching and control of heavy electrical circuits, such as large resistive, motor, and lighting loads.

RIBT Series - High/Low Voltage Separation

The **RIBT Series** is designed to provide physically separate entrances for connections to the relay input coil and output contacts. Relay contact wires exit the housing through a 1/2" or 3/4" NPT nipple. The cover of the **RIBT Series** is removable and, with star bushings or 1/2" conduit, the coil drive wires can enter the housing through one of two convenient openings. The coil drive wires are secured to screw terminals within a separate wiring compartment in the **RIBT**. Most of the **RIBs** in the **Power Series** are also available in the **T Series**.

RIB, RIBT Power Series

FEATURES

- ***Convenient and economical to use***
- ***Relay status indicator via LED***
- ***Coil uses low current and accepts a wide range of AC and DC voltages***
- ***Closed/Open/Auto switch option available***
- ***Nipple or screw mountable***
- ***Compact, gray plastic enclosure***
- ***Color-coded wires for eliminating errors***
- ***UL listed for UL916 Energy Management and UL864 Fire***
- ***Made in the USA***

SPECIFICATIONS - GENERAL

Frequency	50/60 Hz
Wire Length	16" (40.6 cm)
Life Rating	10 million cycles minimum mechanical
Relay Status	LED, ON - relay activated
Operating Temperature	-30° to 140°F (-34° to 60°C)
Operating Humidity	5% to 95% non-condensing
Housing Type	NEMA 1, plenum rated
Conduit Hub	1/2" NPT, 3/4" NPT
Dimensions	
A and G size enclosures	2.3" H x 3.2" W x 1.8" D (5.84 x 8.13 x 4.57 cm)
B size enclosures	4" H x 4" W x 1.8" D (10.16 x 10.16 x 4.57 cm)
Approvals	UL listed, UL 916 Energy Management, UL 864 Fire, cUL listed, CSFM, UL File S7312
Warranty	1 year

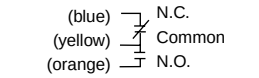
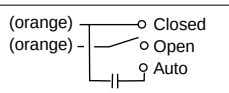
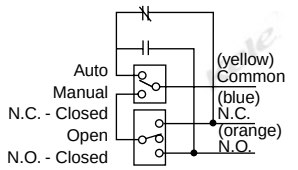
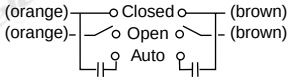
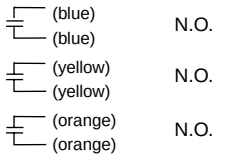
Coil pull-in/drop-out (nominal values)

	PULL-IN		DROP-OUT	
COIL DRIVE	**DC**	**AC**	**DC**	**AC**
24 VAC/VDC	20	20	3.8	3
120 VAC	–	85	–	35
208-277 VAC	–	160	–	60
480 VAC	–	340	–	140

FUNCTIONAL DEVICES RELAY IN A BOX

RIB, RIBT POWER SERIES

SPECIFICATIONS - POWER SERIES

MODEL	TYPE	COIL DRIVE	SIZE-HUB	OVR SW	RELAY CONTACT RATINGS*	RELAY CONTACT WIRING	RELAY COIL DRIVE DATA
RIB2401B**	1-SPDT	24 VAC/VDC 120 VAC	G-1/2	–	20A resistive 277 VAC 1 hp 120 VAC 2 hp 277 VAC 20A ballast N.O. 120/277 VAC 10A ballast N.C. 120/277 VAC 10A tungsten N.O. 120 VAC 770 VA pilot duty 120 VAC 1110 VA pilot duty 277 VAC		**Wiring** Common - White/Yellow wire 24 VAC/VDC - White/Blue wire 120 VAC - White/Black wire 208-277 VAC - White/Brown wire **Input Current** 75 mA @ 24 VAC 32 mA @ 24 VDC 42 mA @ 120 VAC 62 ma @ 208/277 VAC
RIB2402B**	1-SPDT	24 VAC/VDC 208 - 277 VAC	G-1/2	–			
RIB2401SB**	1-SPST-NO	24 VAC/VDC 120 VAC	G-1/2	Yes	20A resistive 277 VAC 1 hp 120 VAC 2 hp 277 VAC 20A ballast N.O. 120/277 VAC 10A ballast N.C. 120/277 VAC 10A tungsten N.O. 120 VAC 770 VA pilot duty 120 VAC 1110 VA pilot duty 277 VAC	 For normally closed, add **-NC** after model number when ordering.	
RIB2402SB**	1-SPST-NO	24 VAC/VDC 208 - 277 VAC	G-1/2	Yes			
RIB01P	1-DPDT	120 VAC	B-1/2	–	20A resistive 300 VAC 20A resistive 28 VDC, 15 VDC 15A resistive 600 VAC 1 hp 120 VAC 2 hp 240-277 VAC 3 hp 480-600 VAC 20A ballast 277-480 VAC 770 VA pilot duty 120 VAC 1,158 VA pilot duty 240 VAC 1,110 VA pilot duty 277 VAC 1,640 VA pilot duty 480 VAC		**Wiring** 120 VAC - White/Black wires 208-277 VAC - White/Brown wires 480 VAC - White/Green wires **Input Current** 100 mA @ 120-480 VAC
RIB02P	1-DPDT	208-277 VAC	B-1/2	–			
RIB04P	1-DPDT	480 VAC	B-1/2	–			
RIB24P**	1-DPDT	24 VAC/VDC	G-1/2	–			**Wiring** 24 VAC White/Yellow wires **Input Current** 125 mA @ 24 VAC 50 mA @ 24 VDC
RIB2401SBC**	1-SPDT	24 VAC/VDC 120 VAC	G-1/2	Yes-2	20A resistive 277 VAC 1 hp 120 VAC 2 hp 277 VAC 20A ballast N.O. 120/277 VAC 10A ballast N.C. 120/277 VAC 10A tungsten N.O. 120 VAC 770 VA pilot duty 120 VAC 1110 VA pilot duty 277 VAC		**Wiring** Common - White/Yellow wire 24 VAC/VDC - White/Blue wire 120 VAC - White/Black wire 208-277 VAC - White/Brown wire **Input Current** 75 mA @ 24 VAC 32 mA @ 24 VDC 42 mA @ 120 VAC
RIB2402SBC**	1-SPDT	24 VAC/VDC 208 - 277 VAC	G-1/2	Yes-2			
RIB24S2*	1-DPST-NO	24 VAC/VDC	B-1/2	Yes Double Pole	20A resistive 277 VAC 1 hp 120 VAC 2 hp 240-277 VAC 10A tungsten 120 VAC 20A ballast 277-480 VAC 770 VA pilot duty 120 VAC 1,110 VA pilot duty 277 VAC	**Double Pole Switch**  For normally closed, add **-NC** after model number when ordering.	**Wiring** 24 VAC/VDC White/Yellow wires 120 VAC White/Black wires 208-277 VAC White/Brown wires 480 VAC White/Green wires **Input Current** 125 mA @ 24 VAC 50 mA @ 24 VDC 75 mA @ 120 VAC 95 mA @ 208-277 VAC 95 mA @ 480 VAC
RIB01S2		120 VAC					
RIB02S2		208-277 VAC					
RIB04S2		480 VAC					
RIB243P**	1-3PST-NO	24 VAC/VDC	B-1/2	–	20A resistive 300 VAC 20A resistive 28 VDC 15A resistive 600 VAC 1 hp 120 VAC, 1 PH 2 hp 240-277 VAC, 1 PH 3 hp 480-600 VAC 1 PH 5 hp 240 VAC, 3 PH 7.5 hp 480 VAC 3 PH 20A ballast 277-480 VAC 1466 VA 240 VAC, 3 PH 2112 VA 480 VAC, 3 PH	 For normally closed, add **-NC** after model number when ordering.	**Wiring** 24 VAC/VDC - White/Yellow wires 120 VAC - White/Black wires 208-277 VAC - White/Brown wires 480 VAC - White/Green wires **Input Current** 190 mA @ 24 VAC 140 mA @ 30 VDC 140 mA @ 120 VAC 170 mA @ 208-277 VAC 120 mA @ 480 VAC
RIB013P	1-3PST-NO	120 VAC	B-1/2	–			
RIB023P	1-3PST-NO	208-277 VAC	B-1/2	–			
RIB043P	1-3PST-NO	480 VAC	B-1/2	–			
RIB24P30	1-DPDT	24 VAC/VDC	A-3/4	–	30A resistive 300 VAC 25A resistive 28 VDC 15A resistive 600 VAC 1 hp 120 VAC 2 hp 240-277 VAC 3 hp 480-600 VAC 20A ballast 277-480 VAC 770 VA pilot duty 120 VAC 1,158 VA pilot duty 240 VAC 1,110 VA pilot duty 277 VAC 1,640 VA pilot duty 480 VAC		**Wiring** 24 VAC/VDC - White/Yellow wires **Input Current** 125 mA @ 24 VAC 50 mA @ 24 VDC

*Not rated for electronic ballast

ORDERING INFORMATION

Order by model number

** Models may be ordered in **RIBT Series** with high/low voltage separation.
*** Can be ordered normally closed by adding - **NC** after the model number.
† N4 has NEMA 4 housing

FUNCTIONAL DEVICES RELAY IN A BOX

RIB, RIBT PILOT SERIES

DESCRIPTION

The **Relay In A Box (RIB) Pilot Series** from Functional Devices controls most BAS, HVAC, low-horsepower motor and lighting applications. The relays come mounted and pre-wired in a housing, saving the installer the time, trouble, and expense of buying separate components (relay, socket, mounting rail, and enclosure) and assembling them on the job or at the shop.

The **RIB Pilot Series** has a protruding 1/2" or 3/4" NPT nipple from which all wires exit (except T series). To install, remove a conduit knockout in the equipment, insert the wires and nipple through the hole, tighten the locknut, and connect the wires.

RIB Pilot Series - 10A Relays
The RIB Pilot Series has relay contacts rated for 10A and is used to control light electrical loads, drive power relays/ contactors, or sense the voltage being fed to electrical loads. The **RIB Pilot Series** requires a low coil-drive current and is provided with circuitry to allow powering the relay coil from a wide range of AC or DC voltages.

RIBT Series - High/Low Voltage Separation
The **RIBT Series** is designed to provide physically separate entrances for connections to the relay input coil and output contacts. Relay contact wires exit the housing through a 1/2" or 3/4" NPT nipple. The cover of the **RIBT Series** is removable, and the coil drive wires can enter the housing through one of two convenient openings with star bushings or 1/2" conduit. The coil drive wires are secured to screw terminals within a separate wiring compartment in the **RIBT Series**. Most of the **RIB's** in the **Pilot Series** are also available in the **RIBT Series.**

Functional Devices, Inc. RIB

RIBU1C

RIBU1S

MADE IN USA

c UL us

FEATURES

- ***Convenient and economical to use***
- ***Relay status indicator via LED***
- ***Coil uses low current and accepts a wide range of AC and DC voltages***
- ***Closed/Open/Auto switch option available***
- ***Nipple- or screw-mountable***
- ***Compact, gray plastic enclosure***
- ***Color-coded wires for eliminating errors***
- ***UL listed for UL916 Energy Management and UL864 Fire***
- ***Made in the USA***

SPECIFICATIONS - GENERAL

Frequency	50/60 Hz
Wire Length	16" (40.6 cm)
Life Rating	10 million cycles minimum mechanical
Relay Status	LED, ON - relay activated
Operating Temperature	-30° to 140°F (-34° to 60°F)
Operating Humidity	5-95% RH non-condensing
Housing Type	Plenum rated, NEMA 1, NEMA 4
Conduit Hub	1/2" NPT, 3/4" NPT
Dimensions	
A size enclosures	1.7" H x 2.8" W x 1.5" D (4.32 x 7.11 x 3.81 cm)
B size enclosures	4.0" H x 4.0" W x 1.8" D (10.16 x 10.16 x 4.57 cm)
G size enclosures	2.3" H x 3.2"W x 1.8" D (5.84 x 8.13 x 4.57 cm)

Approvals	UL listed, UL 916 Energy Management UL 864 Fire, cUL listed, CSFM, UL File S7312
Warranty	1 year

Coil pull-in/drop-out (nominal values)

	PULL-IN		DROP-OUT	
COIL DRIVE	**DC**	**AC**	**DC**	**AC**
10-30 VAC/VDC	10	9	2.8	2.1
24 VAC/VDC	20	18	3.8	3
120 VAC	–	102	–	9
208-277 VAC	–	176	–	13

FUNCTIONAL DEVICES RELAY IN A BOX

RIB, RIBT PILOT SERIES

SPECIFICATIONS - PILOT SERIES

MODEL	TYPE	COIL DRIVE	SIZE/ HUB	OVR SW	RELAY CONTACT RATINGS	RELAY CONTACT WIRING	RELAY COIL DRIVE DATA
RIBU1C* **RIBU1C-N4†**	1-SPDT	10-30 VAC/VDC 120 VAC 50/60 Hz	A-1/2	–	10A resistive 120/240/277 VAC 10A resistive 28 VDC 480 VA pilot duty 240/277 VAC 480 VA ballast 277 VAC 600W tungsten 120 VAC N.O. 240W tungsten 120 VAC N.C. 1/3 hp for N.O. 120/240 VAC 1/6 hp for N.C. 120/240 VAC 1/4 hp for N.O. 277 VAC 1/8 hp for N.C. 277 VAC	**Relay #1** NC (blue) COM (yellow) NO (orange) **Relay #2** (if present) NC (gray) COM (purple) NO (brown)	**Wiring** **Relay #1** Common - White/Yellow wire 10-30 VAC/VDC - White/Blue wire 120 VAC - White/Black wire 208-277 VAC - White/Brown wire **Relay #2** (if present) Common - White/Purple wire 10-30 VAC/VDC - Gray/White wire 120 VAC - White/Red wire 208-277 VAC - White/Orange wire **Input Current** 30 mA @ 10 VAC 32 mA @ 12 VAC 42 mA @ 24 VAC 50 mA @ 30 VAC 25 mA @ 120 VAC 35 mA @ 208-277 VAC 12 mA @ 10 VDC 14 mA @ 12 VDC 16 mA @ 24 VDC 18 mA @ 30 VDC
RIBH1C* **RIBH1C-N4†**	1-SPDT	10-30 VAC 208-277 VAC 50/60 Hz	A-1/2	–			
RIBH2C*	2-SPDT		G-3/4	–			
RIBU1SC*	1-SPDT	10-30 VAC/VDC 120 VAC 50/60 Hz	G-1/2	Yes-2	10A resistive 277 VAC 480 VA pilot duty 277 VAC 480 VA ballast 277 VAC 600W tungsten 120 VAC N.O. 240W tungsten 120 VAC N.C. 1/3 hp for N.O. 120-240 VAC 1/6 hp for N.C. 120-240 VAC 1/4 hp for N.O. 277 VAC 1/8 hp for N.C. 277 VAC Status Contact on **RIBU1SM** and **RIBH1SM**: 5A max @ 277 VAC	Auto / Manual (yellow) Common N.C. - Closed / Open / N.O. - Closed (blue) N.C. (orange) N.O. **Relay #1** (orange) (orange) Closed / Open / Auto **Relay #2 of RIBU2S2** Closed (brown) Open (brown) Auto **Relay #2 of RIBU2SC** NC (gray) COM (purple) NO (brown) **STATUS** = 2nd Pole of switch of **RIBU1SM**, **RIBH1SM** Closed (brown) Open (purple) Auto (gray)	
RIBH1SC*	1-SPDT	10-30 VAC 208-277 VAC 50/60 Hz	G-1/2	Yes-2			
RIBU1S*	1-SPST-NO**	10-30 VAC/VDC 120 VAC 50/60 Hz	G-1/2	Yes			
RIBU2SC	1-SPST-NO** 1-SPDT		G-3/4	Yes			
RIBU2S2	2-SPST-NO**		B-3/4	Yes-2			
RIBU1SM	1-SPST-NO**		G-1/2	Yes + Status			
RIBH1S*	1-SPST-NO**	10-30 VAC/VDC 208-277 VAC 50/60 Hz	G-1/2	Yes			
RIBH1SM	1-SPST-NO**		G-1/2	Yes + Status			
RIB2401D* **RIB2401D-N4†**	1-DPDT	24 VAC/VDC 120 VAC 50/60- Hz	A-1/2	–	10A resistive 30 VDC 10A resistive 277 VAC 1/2 hp for N.O. 120/240 VAC 1/3 hp for N.C. 120/240 VAC	NC (blue) COM (yellow) NO (orange) NC (gray) COM (purple) NO (brown)	**Wiring** Common - White/Yellow wire 24 VAC/VDC - White/Blue wire 120 VAC - White/Black wire 208-277 VAC - White/Brown wire **Input Current** 24 mA @ 18 VAC 20 mA @ 20 VDC 32 mA @ 24 VAC 24 mA @ 30 VDC 40 mA @ 30 VAC 36 mA @ 30 VDC 31 mA @ 120 VAC (RIB2401D) 36 mA @ 208-277 VAC (RIB2402D)
RIB2402D **RIB2402D-N4†**	1-DPDT	24 VAC/VDC 208-277 VAC 50/60 Hz	A-1/2	–	10A resistive 30 VDC 10A resistive 277 VAC 180 VA pilot duty 120 VAC 1/8 hp for N.C. 120 VAC		
RIBL3C	3-SPST-NO	10-30 VAC/VDC 50/60 Hz	B-1/2	–	10A resistive 120-277 VAC 10A resistive 28 VDC 480 VA pilot duty 240-277 VAC 480 VA ballast 277 VAC 600W tungsten 120 VAC N.O. 240W tungsten 120 VAC N.C. 1/3 hp for N.O. 120-240 VAC 1/6 hp for N.C. 120-240 VAC 1/4 hp for N.O. 277 VAC 1/8 hp for N.C. 277 VAC	**Relay #1** (black) (black) **Relay #2** (blue) (blue) **Relay #3** (yellow) (yellow) **Relay #4 (if present)** NC (gray) COM (purple) NO (brown)	**Wiring** Common - White/Red wire Relay#1 - White/Black wire Relay#2 - White/Blue wire Relay#3 - White/Yellow wire Relay#4 - White/Brown wire (if present) **Input Current** 30 mA @ 10 VAC 12 mA @ 10 VDC 32 mA @ 12 VAC 14 mA @ 12 VDC 42 mA @ 24 VAC 16 mA @ 24 VDC 50 mA @ 30 VAC 18 mA @ 30 VDC
RIBL4C	3-SPST-NO 1-SPDT		B-1/2	–			
SIB02S	SPDT Manual Switch	–	A-1/2	Yes	Switch ratings 20A 277 VAC	(blue) (yellow) (orange)	No Relay Switch Only

NOTE: See previous page for dimensions for **A**, **B**, and **G** Enclosures

ORDERING INFORMATION

Order by model number

* Models may be ordered in **RIBT Series** with high/low voltage separation.

** Can be ordered normally closed by adding **- NC** after model number.

† **N4** has NEMA 4 housing

CURRENT-OPERATED SWITCHES & TRANSDUCERS

RIBXG, RIBXK, RIBXK420 SERIES

DESCRIPTION

The **Functional Devices RIBXK, RIBXG, RIBXK420 Series** include both current-operated switches and current transducers. Solid-core and split-core current-operated switch models have a solid-state switch that operates when the current level sensed by the internal current transformer exceeds a fixed or adjustable set point. Solid-core current transducer models output a 4-20 mA signal proportional to the line current being monitored.

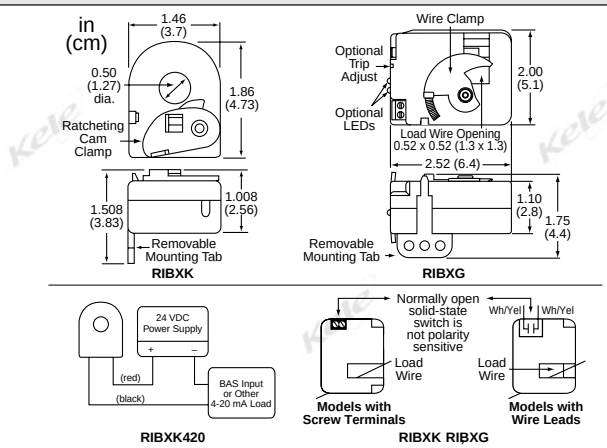
FEATURES

- ***Solid- and split-core switch models have fixed (go/no go) or adjustable trip points***
- ***Solid-core transducer models have a 4-20 mA output***
- ***Low cost***
- ***Ratcheting cam clamp to secure switch to wire***
- ***Removable mounting tab***

SPECIFICATIONS

RIBXK, RIBXG SERIES	
Monitored AC Current	
RIBXKF, RIBXKTF	0.25-150A
RIBXKA, RIBXKTA	0.5-150A
RIBXGF, RIBXGTF	0.35-150A
RIBXGA, RIBXGTA	0.75-150A
Relay Trip Point	
RIBXKF, RIBXKTF	0.25A, fixed
RIBXKA, RIBXKTA	0.5-150A, adjustable
RIBXGF, RIBXGTF	0.35A, fixed
RIBXGFL, RIBXGTFL	0.75A, fixed
RIBXGA, RIBXGTA	0.75-150A, adjustable
Relay Type	Solid state, normally open
Relay Rating	30 VAC/VDC, 0.4A maximum
Off State Leakage	<30 µA @ 30 VAC/VDC
On State Voltage Drop	<0.3 VAC/VDC @ 0.1A <1.6 VAC/VDC @ 0.4A
RIBXK420 SERIES	
Supply Voltage	24 VDC
Output	4-20 mA @ 600Ω, 30 mA maximum
Accuracy	±5% FS
Linearity	±1% FS
Input Range	20, 50, or 100A
General	
Frequency	Suitable for most VFD applications
Maximum Sensed Voltage	600 VAC
Terminations	16" (40.6 cm), 18 AWG, 600V wires or terminals for 14-22 AWG
Operating Temperature	-30° to 140°F (-34.4° to 60°C)
Weight	0.3 lb (0.13 Kg)
Approvals	UL916, UL864 UL File #S7312, CE, RoHs
Warranty	1 year

DIMENSIONS



ORDERING INFORMATION

MODEL	DESCRIPTION
RIBXKF	Solid-core current-operated switch, wire leads, fixed-trip
RIBXKTF	Solid-core current-operated switch, terminals, fixed-trip
RIBXKA	Solid-core current-operated switch, wire leads, adjustable-trip
RIBXKTA	Solid-core current-operated switch, terminals, adjustable-trip
RIBXK420-20	Solid-core current transducer, 0-20A
RIBXK420-50	Solid-core current transducer, 0-50A
RIBXK420-100	Solid-core current transducer, 0-100A
RIBXGF	Split-core current-operated switch, fixed 0.35A trip, wire leads
RIBXGTF	Split-core current-operated switch, fixed 0.35A trip, terminal strip
RIBXGFL	Split-core current-operated switch, fixed 0.75A trip, wire leads, LEDs
RIBXGTFL	Split-core current-operated switch, fixed 0.75A trip, terminal strip, LEDs
RIBXGA	Split-core current-operated switch, adjustable trip, wire leads, LEDs
RIBXGTA	Split-core current-operated switch, adjustable trip, terminal strip, LEDs

DUCT THERMISTOR AND RTD SENSORS
ST-D SERIES*

DESCRIPTION

The **PreCon Model ST-D* Duct Thermistor and RTD Sensor** provides precision remote temperature sensing for building automation systems and mechanical equipment room instrumentation. The active sensing element is a highly stable precision thermistor material or platinum RTD. The sensing element is sealed with a thermally conductive compound in a 9" (22.8 cm) long 304 stainless steel tube attached to a 4" (10 cm) electrical strap. The slots in the mounting bracket form mounting ears for direct duct mounting and standard electrical boxes. The grommet on the tube fitting seals a 9/16" (1.43 cm) insertion hole.

FEATURES

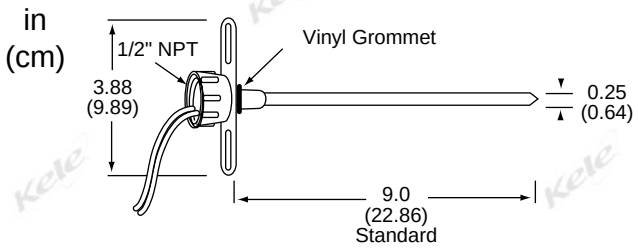
- ***Lifetime warranty***
- ***Wide selection of thermistor and RTD curves***
- ***Tip sensitive for precise temperature response***
- ***Adaptable with many options***
- ***304 stainless steel probe***
- ***Greenfield fitting standard***
- ***Ultra high accuracy optional***

APPLICATION

The **ST-D* Series** sensors are designed for direct mounting on sheet metal duct systems. Where conduit is required, the duct sensors have a universal nylon mounting connector that adapts to a 1/2" knockout in a standard handy box. The nylon fitting has a 1/2" NPT female conduit fitting.

The duct temperature sensors are waterproof and can be used in high humidity and condensing air. The sensors are point-sensitive and come standard with 9" (22.8 cm) insertion depth. The XL option provides custom lengths.

DIMENSIONS



SPECIFICATIONS

Accuracy	
Thermistor	±0.36°F (0.2°C)
RTD	
Type 63	±0.72°F (0.40°C)
Type 71	±0.054°F (0.03°C)
Type 81, 85	±0.27°F (0.15°C)
Type 91	±0.54°F (0.30°C)
Sensor Type	
Thermistor	2.252 kΩ, 3 kΩ, 10 kΩ Type II, III, & III w/11K shunt, 20 kΩ, 100 kΩ
RTD	
Type 63	1000Ω Nickel
Type 71, 81	100Ω Pt 385 Curve
Type 85	1000Ω Pt 385 Curve
Type 91	1000Ω Pt 375 Curve
Temperature Range	
Thermistor/RTD	-40° to 221°F (-40° to 105°C)

Temperature Coefficient	
Thermistor	Negative temperature coefficient
RTD	Positive temperature coefficient
Temperature Stability	
Thermistor	0.24°F (0.13°C) over five years
Heat Dissipation	2.7 mW/°C (power needed to raise the temperature by 1°C)
Mounting	Directly to duct, wall, or single gang box
Wiring Terminations	8' (2.4m) of 24 AWG pigtails with prestripped ends, type 71 & 81 sensors have 18" leads
Weight	0.25 lb (0.1 kg) with no options
Approvals	CE
Warranty	Lifetime

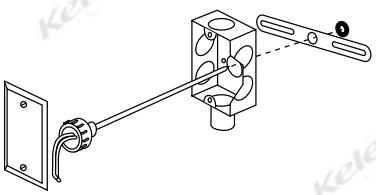
DUCT THERMISTOR AND RTD SENSORS

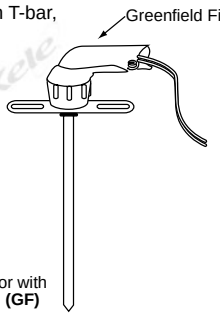
ST-D SERIES*

MOUNTING

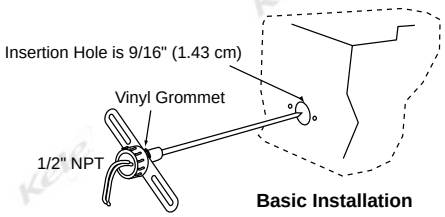
Direct duct-mount screws can be used where conduit is not required. Adapters are not required when mounting directly to outlet boxes. Install grommet in the 9/16" (1.43 cm) insertion hole.

Basic model comes with 8' (2.4m) of 24 AWG, 9" (22.86 cm) probe with T-bar, grommet, and #6 x 1 screws for direct duct mounting.





Duct temperature sensor with Greenfield fitting option **(GF)**



Basic Installation

ORDERING INFORMATION

MODEL	DESCRIPTION
ST-D3	10,000Ω duct thermistor @ 77°F (25°C), Type III (gray leads)
ST-D11K	10,000Ω duct thermistor @ 77°F (25°C), Type III with 11K shunt (gray leads)
ST-D21	2252Ω duct thermistor @ 77°F (25°C), Type II (green leads)
ST-D22	3000Ω duct thermistor @ 77°F (25°C), Type II (blue leads)
ST-D24	10,000Ω duct thermistor @ 77°F (25°C), Type II (yellow leads)
ST-D27	100,000Ω duct thermistor @ 77°F (25°C), Type II (gray leads)
ST-D42	20,000Ω duct thermistor @ 77°F (25°C), Type IV (green leads)
ST-D63	1000Ω nickel duct RTD @ 32°F (0°C), (yellow leads)
ST-D71	100Ω ultra high accurate duct RTD @ 32°F (0°C), 385 platinum curve (blue leads)
ST-D81	100Ω duct RTD @ 32°F (0°C), 385 platinum curve (yellow leads)
ST-D85	1000Ω duct RTD @ 32°F (0°C), 385 platinum curve (blue leads)
ST-D91	1000Ω duct RTD @ 32°F (0°C), 375 platinum curve (green leads)

OPTIONS (List options in alphabetical order with dashes)

QD¼	Nylon insulated Quick Disconnect 1/4"
X25	25' (7.6m) lead length 24 AWG
XC25	25' (7.6m) lead length jacketed cable
XCO	1/2" LB condulet fitting
XCP25	25' Non-shielded plenum cable
XD	Dual sensors in one probe
XG	Greenfield fitting (factory installed)
XH	Handy box housing (factory installed)
XHP	Non-metallic handy box housing (factory installed)
XL	Custom length insertion probes 1" to 108"
XL2	Custom length insertion probe, 4-7/8"(12.38 cm)
XL2 in	Custom length insertion probe, 2"(5.08 cm)
XLT	Liquid-tight fitting (factory installed)
XN	Certificate of conformance
XNB	1/2" MNPT brass close nipple
XNP	1/2" MNPT plastic close nipple
XN1	NIST certificate, one reference point 32°F(0°C)
XN2	NIST certificate, two reference points 32°F/158°F(0°C/70°C)
XN3	NIST certificate, three reference points 32°F/77°F/158°F(0°C/25°C/70°C)
XP	Matched sensor pair, matched to ±0.1°F, 0.05°C (must order two sensors)
XPA	Ultra high accuracy, thermistors only, ±0.135˚F (0.075˚C)
XW	Weather resistant housing (factory installed)
XZ	Three wire RTD connections (optional only on Type 81, standard on Type 71, not available with XC25 and XCP25)

ST-D3 – **XG**

Example: **ST-D3-XG** 10,000Ω Type III duct temperature sensor with Greenfield fitting

RELATED PRODUCTS

KT1	Mounting screwdriver 1/16" allen key
T81U-XR	100 ohm, Type 81 4-20 mA temperature transmitter, custom rangeable
T85U-XR	1000 ohm, Type 85 4-20 mA temperature transmitter, custom rangeable
T91U-XR	1000 ohm, Type 91 4-20 mA temperature transmitter, custom rangeable
UR	Moisture-resistant three-wire butt splice

RIGID AVERAGING THERMISTOR AND RTD SENSOR

ST-FZR SERIES

DESCRIPTION

The **Precon ST-FZR* Series Rigid Averaging Thermistor and RTD Sensor** provides precision remote temperature sensing for building automation systems and mechanical equipment room instrumentation. The active sensing elements are constructed of highly stable precision thermistor materials or platinum RTDs.

The sensing elements are sealed in a 304 stainless steel probe attached to a standard handy box with mounting bracket attached.

ST-FZR Rigid Averaging Sensor

FEATURES

- ***Lifetime warranty***
- ***±0.36°F (±0.2°C) accuracy***
- ***Wide selection of thermistor curves***
- ***Four lengths to fit to most duct sizes***
- ***Easy to mount to duct wall***
- ***Four sensing elements in a series-parallel arrangement***
- ***Rigid sensor***

OPTIONS

- ***Weather resistant handy box***
- ***25' lead length***

APPLICATION

The **ST-FZR* Series** is designed for direct mounting to sheet metal for average duct temperature sensing. The sensors contain four sensing elements. The thermistors are configured in a series/parallel method, which creates an end result of total average resistance, equal to the same span as a standard thermistor, with a temperature range of 32° to 160°F (0° to 71°C).

SPECIFICATIONS

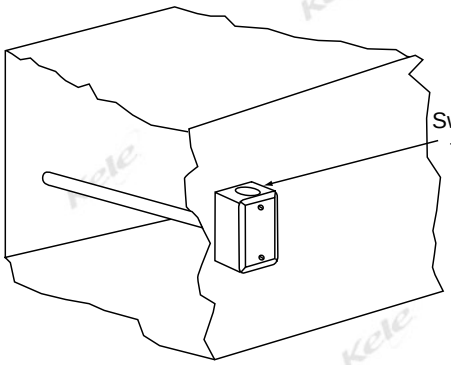
Accuracy	
Thermistor	±0.36°F (0.2°C)
RTD	
Type 81, 85	±0.27°F (0.15°C)
Type 91	±0.54°F (0.30°C)
Temperature Stability	
Thermistor	0.24°F (0.13°C) over five years
Heat Dissipation	2.7 mW/°C (power needed to raise the temperature by 1°C)
Sensor Type	
Thermistor	2.252 kΩ, 3 kΩ, 10 kΩ Type II, III, & III w/11K shunt, 20 kΩ, 100 kΩ
RTD	
Type 81	100Ω Pt 385 Curve
Type 85	1000Ω Pt 385 Curve
Type 91	1000Ω Pt 375 Curve

Temperature Coefficient	
Thermistor	Negative temperature coefficient
RTD	Positive temperature coefficient
Temperature Range	
Thermistor/RTD	-40° to 221°F (-40° to 105°C)
Enclosure	Metal handy box
Mounting	Directly to duct with back box
Wiring Terminations	8' (2.4m) of 24 AWG prestripped pigtails, Type 81 sensor has 18" leads
Approvals	CE
Weight	
12"	0.5 lb (0.23 kg)
18"	0.6 lb (0.3 kg)
24"	0.7 lb (0.32 kg)
36"	0.8 lb (0.37 kg)
Warranty	Lifetime

RIGID AVERAGING THERMISTOR AND RTD SENSOR

ST-FZR SERIES

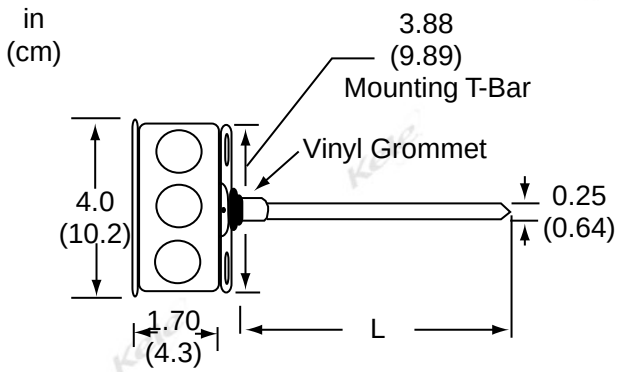
MOUNTING



356-090
Swivel Flange Bracket
for angle mounting
as needed

Supports typically not required

DIMENSIONS



ORDERING INFORMATION

MODEL	DESCRIPTION
ST-FZR3	10,000Ω rigid averaging thermistor @ 77°F (25°C), Type III (gray leads)
ST-FZ11K	10,000Ω rigid averaging thermistor @ 77°F (25°C), Type III with 11K shunt (gray leads)
ST-FZR21	2252Ω rigid averaging thermistor @ 77°F (25°C), Type II (green leads)
ST-FZR22	3000Ω rigid averaging thermistor @ 77°F (25°C), Type II (blue leads)
ST-FZR24	10,000Ω rigid averaging thermistor @ 77°F (25°C) Type II (yellow leads)
ST-FZR27	100,000Ω rigid averaging thermistor @ 77°F (25°C), Type II (gray leads)
ST-FZR42	20,000Ω rigid averaging thermistor @ 77°F (25°C), Type IV (green leads)
ST-FZR81	100Ω rigid averaging RTD @ 32°F (0°C), 385 platinum curve (yellow leads)
ST-FZR85	1000Ω rigid averaging RTD @ 32°F (0°C), 385 platinum curve (blue leads)
ST-FZR91	1000Ω rigid averaging RTD @ 32°F (0°C), 375 platinum curve (green leads)

INSERTION LENGTH	
12	12" length (30.48 cm)
18	18" length (45.72 cm)
24	24" length (60.96 cm)
36	36" length (91.44 cm)

QD¼	Nylon insulated quick disconnect ¼"
X25	25' (7.6m) lead length 24 AWG
XC25	25' (7.6m) lead length 24 AWG jacketed cable
XCO	½" LB condulet fitting
XCP25	25' (7.6m) non-shielded 22AWG plenum cable
XLT	Liquid-tight fitting (factory installed)
XN	Certificate of conformance
XN1	NIST certificate, one reference point 32°F(0°C)
XN2	NIST certificate, two reference points 32°F/158°F(0°C/70°C)
XN3	NIST certificate, three reference points 32°F/77°F/158°F(0°C/25°C/70°C)
XNB	½" MNPT brass close nipple
XNP	½" MNPT plastic close nipple
XW	Weather resistant housing

ST-FZR3 – **12**

Example: **ST-FZR3-12** 10,000Ω Type III averaging thermistor sensor with 12" (7.62m) probe and four sensing elements

RELATED PRODUCTS

		PAGE
356-090	Swivel flange bracket	
T81PNR Series	Temperature transmitter for type 81, 385 platinum curve sensors, cover mounted	**1288**
T81U Series	Temperature transmitter for type 81, 385 platinum curve sensor, track mounted	**1281**
T85PNR Series	Temperature transmitter for type 85, 385 platinum curve sensors, cover mounted	**1288**
T85U Series	Temperature transmitter for type 85, 385 platinum curve sensor, track mounted	**1279**
T90PNR Series	Temperature transmitter for type 91, 375 platinum curve sensors, cover mounted	**1288**
T91U Series	Temperature transmitter for type 91, 375 platinum curve sensor, track mounted	**1277**
UR	Moisture-resistant three-wire butt splice	**229**

FUNCTIONAL DEVICES CONTROL TRANSFORMERS

RIB TR SERIES

DESCRIPTION

The **Functional Devices RIB TR Series** offers a complete line of control transformers for use in building automation and temperature control systems. The series includes transformer VA ratings from 20 VA up through 375 VA and primary voltages of 120, 208, 240, 277, and 480 VAC. Isolation transformers for 24 VAC circuits are also included. All **RIB TR Series** transformers are UL listed and feature split-bobbin construction. Some also have a secondary circuit breaker.

FEATURES

- ***Complete line of control transformers from 20 VA to 375 VA***
- ***Foot and hub mounting on most models***
- ***All models UL listed, many are Class 2 rated***
- ***Ambient temp -30° to 140°F (0° to 60°C)***
- ***Color-coded wire leads***
- ***One year warranty***

RIB TR Series

SPECIFICATIONS

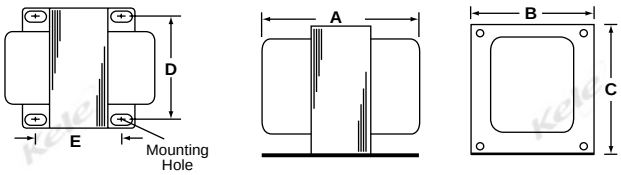
ORDER NUMBER	VA RATING	PRIMARY:SECONDARY VOLTAGE (VAC)	FREQ (HZ)	CIRCUIT BREAKER	MOUNTING H=HUB	AGENCY APPROVALS
TR20VA001	20	120:24	50/60	No	1H + Foot	Class 2 UL5085-3 listed,C-UL,CE,RoHS E197146
TR20VA002	20	208:24	50/60	No	2H + Foot	Class 2 UL5085-3 listed,C-UL,CE,RoHS E197146
TR20VA003	20	24:24 (isolation)	50/60	No	1H + Foot	Class 2 UL508-2 listed General Purpose,C-UL,CE,RoHS E197147
TR20VA004	20	120:24	50/60	No	2H + Foot	Class 2 UL5085-3 listed,C-UL,CE,RoHS E197146
TR20VA007	20	277:24	50/60	No	1H + Foot	Class 2 UL5085-3 listed,C-UL,CE,RoHS E197146
TR40VA001	40	120:24	50/60	No	1H + Foot	Class 2 UL5085-3 listed,C-UL,CE,RoHS E197146
TR40VA002	40	120:24	50/60	No	2H + Foot	Class 2 UL5085-3 listed,C-UL,CE,RoHS E197146
TR40VA003	40	24:24	50/60	No	1H + Foot	Class 2 UL508-2 listed General Purpose,C-UL,CE,RoHS E197147
TR40VA004	40	277/240/208/120:24	50/60	No	2H + Foot	Class 2 UL5085-3 listed,C-UL,CE,RoHS E197146
TR40VA013	40	480/277/240/208:120	50/60	No	1H + Foot	Class 2 UL508-2 listed General Purpose,C-UL,CE,RoHS E197147
TR40VA015	40	240/208/120:24	50/60	No	1H + Foot	Class 2 UL5085-3 listed,C-UL,CE,RoHS E197146
TR40VA022	40	120:24	50/60	No	2H + Foot	Class 2 UL5085-3 listed,C-UL,CE,RoHS E197146
TR40VA040	40	240/208/120:24	50/60	No	2H + Foot	Class 2 UL5085-3 listed,C-UL,CE,RoHS E197146
TR50VA001	50	120:24	50/60	No	2H + Foot	Class 2 UL5085-3 listed,C-UL,CE,RoHS E197146
TR50VA002	50	120:24	50/60	No	2H + Foot	Class 2 UL5085-3 listed,C-UL,CE,RoHS E197146
TR50VA003	50	208:24	50/60	No	2H + Foot	Class 2 UL5085-3 listed,C-UL,CE,RoHS E197146
TR50VA004	50	480/277/240/120:24	50/60	Yes	2H + Foot	Class 2 UL5085-3 listed,C-UL,CE,RoHS E197146
TR50VA005	50	120:24	50/60	Yes	1H + Foot	Class 2 UL5085-3 listed,C-UL,CE,RoHS E197146
TR50VA006	50	277:24	50/60	No	1H + Foot	Class 2 UL5085-3 listed,C-UL,CE,RoHS E197146
TR50VA007	50	277:24	50/60	No	2H + Foot	Class 2 UL5085-3 listed,C-UL,CE,RoHS E197146
TR50VA009	50	240/208/120:24	50/60	Yes	2H + Foot	Class 2 UL5085-3 listed,C-UL,CE,RoHS E197146
TR50VA014	50	277:24	50/60	Yes	1H + Foot	Class 2 UL5085-3 listed,C-UL,CE,RoHS E197146
TR50VA015	50	480/277/240/208/120:24	50/60	Yes	1H + Foot	Class 2 UL5085-3 listed,C-UL,CE,RoHS E197146
TR50VA016	50	240/208/120:24	50/60	Yes	1H + Foot	Class 2 UL5085-3 listed,C-UL,CE,RoHS E197146
TR50VA017	50	480/277/208:24	50/60	Yes	1H + Foot	Class 2 UL5085-3 listed,C-UL,CE,RoHS E197146
TR50VA018	50	480/277/240/208:24	50/60	No	Plate	Class 2 UL508-2 listed General Purpose,C-UL,CE,RoHS E197147
TR50VA019	50	277/120:24	50/60	No	Foot	Class 2 UL5085-3 Component Recognized,C-UL,CE,RoHS E197146
TR75VA001	75	120:24	50/60	Yes	1H + Foot	Class 2 UL5085-3 listed,C-UL,CE,RoHS E197146
TR75VA002	75	120:24	50/60	Yes	2H + Foot	Class 2 UL5085-3 listed,C-UL,CE,RoHS E197146
TR75VA003	75	277:24	50/60	Yes	1H + Foot	Class 2 UL5085-3 listed,C-UL,CE,RoHS E197146
TR75VA004	75	480/240/208/120:24	50/60	Yes	1H + Foot	Class 2 UL5085-3 listed,C-UL,CE,RoHS E197146
TR75VA005	75	480/240/208/120:24	50/60	Yes	1H + Foot	Class 2 UL5085-3 listed,C-UL,CE,RoHS E197146
TR75VA007	75	480/240/208/120:24	50/60	Yes	2H + Foot	Class 2 UL5085-3 listed,C-UL,CE,RoHS E197146
TR100VA001	100	120:24	50/60	Yes	1H + Foot	Class 2 UL5085-3 listed,C-UL,CE,RoHS E197146
TR100VA002	100	120:24	50/60	Yes	1H + Foot	Class 2 UL5085-3 listed,C-UL,CE,RoHS E197146
TR100VA004	100	480/277/240/120:24	50/60	Yes	2H + Foot	Class 2 UL5085-3 listed,C-UL,CE,RoHS E197146
TR100VA005	100	480/277/240/120:24	50/60	Yes	1H + Foot	Class 2 UL5085-3 listed,C-UL,CE,RoHS E197146
TR100VA008	100	480/277/240/120:24	50/60	Yes	2H + Foot	UL508-2 listed General Purpose,C-UL,CE,RoHS E197147
TR100VA015	100	480/277/240/120:24	50/60	Yes	1H + Foot	Class 2 UL5085-3 listed,C-UL,CE,RoHS E197146
TR150VA001	150	120:24	50/60	Yes	1H + Foot	UL5085-3 Component Recognized,C-UL,CE,RoHS E197147
TR150VA002	150	120:24	50/60	Yes	2H + Foot	UL508-2 listed General Purpose,C-UL,CE,RoHS E197147
TR150VA008	150	480/277/240/208:24	50/60	Yes	2H + Foot	UL508-2 listed General Purpose,C-UL,CE,RoHS E197147
TR175VA001	175	240/208	50/60	No	Foot	UL508-2 listed General Purpose,C-UL,CE,RoHS E197147
TR175VA002	175	120:24	50/60	No	2H + Foot	UL508-2 listed General Purpose,C-UL,CE,RoHS E197147
TR175VA003	175	120:24	50/60	No	1H + Foot	UL508-2 listed General Purpose,C-UL,CE,RoHS E197147
TR240VA001	240	120:24	50/60	No	1H	UL508-2 listed General Purpose,C-UL,CE,RoHS E197147
TR300VA002	300	480/240/208/120:24	50/60	Yes	Foot	UL508-2 listed General Purpose,C-UL,CE,RoHS E197147
TR375VA001	375	120:24	50/60	No	Foot	UL508-2 listed General Purpose,C-UL,CE,RoHS E197147

FUNCTIONAL DEVICES CONTROL TRANSFORMERS

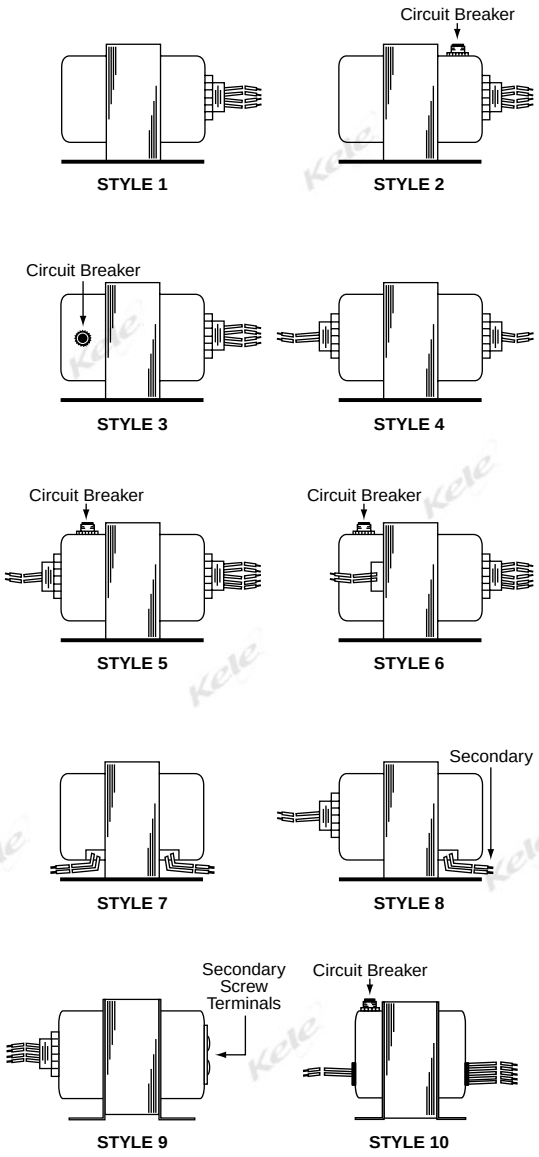
RIB TR SERIES

DIMENSIONS

in
(cm)



MODEL	OUTER DIMENSIONS			MOUNTING DIMENSIONS		WIRES In. (cm)	WEIGHT lb (Kg)	STYLE
	A	B	C	D	E			
TR20VA001	2.226	1.877	2.595	1.619	1.612	8.0 (20.32)	1.20 (0.54)	1
TR20VA002	2.296	1.922	2.616	1.665	1.604	8.0 (20.32)	1.40 (0.64)	4
TR20VA003	2.272	1.900	2.628	1.686	1.635	8.0 (20.32)	1.40 (0.64)	1
TR20VA004	2.310	1.890	5.625	1.625	1.540	8.0 (20.32)	1.40 (0.64)	1
TR20VA007	2.302	1.895	2.607	1.685	1.608	8.0 (20.32)	1.20 (0.54)	1
TR40VA001	2.607	2.169	2.906	1.786	2.020	8.0 (20.32)	2.00 (0.91)	1
TR40VA002	2.634	2.177	2.886	1.775	2.007	8.0 (20.32)	2.00 (0.91)	4
TR40VA003	2.653	2.171	2.882	1.779	2.033	8.0 (20.32)	2.00 (0.91)	1
TR40VA004	2.631	2.177	2.882	1.774	1.998	8.0 (20.32)	2.20 (1.0)	4
TR40VA013	3.325	2.505	3.000	1.986	1.699	8.0 (20.32)	2.65 (1.2)	2
TR40VA015	2.628	2.175	2.907	1.780	2.040	8.0 (20.32)	2.20 (1.0)	1
TR40VA022	2.660	2.172	2.891	1.786	1.980	8.0 (20.32)	2.00 (0.91)	4
TR40VA040	2.728	2.171	2.890	1.792	1.995	8.0 (20.32)	2.20 (1.0)	9
TR50VA001	2.677	2.178	2.879	1.793	2.109	8.0 (20.32)	2.00 (0.91)	1
TR50VA002	2.696	2.181	2.908	1.788	2.053	8.0 (20.32)	2.00 (0.91)	4
TR50VA003	2.695	2.181	2.899	1.778	2.082	8.0 (20.32)	2.00 (0.91)	4
TR50VA004	3.475	2.513	3.014	1.970	1.856	9.5 (24.13)	3.00 (1.36)	5
TR50VA005	3.489	2.515	3.008	1.971	1.870	9.0 (22.86)	2.40 (1.09)	2
TR50VA006	2.763	2.182	2.898	1.790	2.135	8.0 (20.32)	2.00 (0.91)	1
TR50VA007	2.715	2.173	2.886	1.784	2.148	8.0 (20.32)	2.00 (0.91)	4
TR50VA009	3.142	2.504	3.014	1.961	1.864	9.5 (24.13)	2.80 (1.27)	5
TR50VA014	3.479	2.509	3.009	1.965	1.873	9.30 (23.62)	2.60 (1.18)	2
TR50VA015	3.405	2.517	3.013	1.985	1.875	9.5 (24.13)	2.80 (1.27)	2
TR50VA016	3.345	2.510	3.028	1.978	1.842	9.5 (24.13)	2.80 (1.27)	2
TR50VA017	3.470	2.520	3.031	1.872	1.880	9.5 (24.13)	2.86 (1.3)	2
TR50VA018	4.450	4.100	4.100	3.000	Plate Mount	12.0 (30.48)	3.00 (1.36)	–
TR50VA019	2.470	2.170	2.896	1.740	1.850	28.0 (71.12)	1.99 (0.9)	4
TR75VA001	3.743	2.506	3.016	1.974	2.256	9.5 (24.13)	3.40 (1.54)	2
TR75VA002	3.789	2.508	3.013	1.952	2.290	9.5 (24.13)	3.60 (1.63)	5
TR75VA003	3.875	2.507	3.037	1.978	2.269	9.5 (24.13)	3.60 (1.63)	2
TR75VA004	3.802	2.515	3.050	1.990	2.244	9.5 (24.13)	3.60 (1.63)	6
TR75VA005	3.880	2.515	3.030	1.975	2.270	9.5 (24.13)	3.60 (1.63)	5
TR75VA007	2.287	5.504	3.034	1.981	1.708	8.0 (20.32)	3.97 (1.8)	6
TR100VA001	4.085	2.515	3.030	1.975	2.486	8.0 (20.32)	3.80 (1.72)	2
TR100VA002	4.077	2.504	3.023	1.975	2.470	8.0 (20.32)	4.00 (1.81)	5
TR100VA004	4.173	2.523	3.041	1.976	2.647	8.0 (20.32)	4.40 (2.0)	5
TR100VA005	4.258	2.510	3.030	1.968	2.670	8.0 (20.32)	4.40 (2.0)	3
TR100VA008	4.220	5.525	3.022	1.970	2.690	8.0 (20.32)	4.40 (2.0)	6
TR100VA015	4.270	2.500	3.060	2.030	2.699	8.0 (20.32)	4.74 (2.15)	2
TR150VA001	3.650	3.800	3.183	3.150	2.560	9.5 (24.13)	5.00 (2.27)	3
TR150VA002	3.620	3.785	3.160	3.147	2.568	8.0 (20.32)	5.00 (2.27)	4
TR150VA008	4.283	3.786	3.161	3.260	3.211	8.0 (20.32)	7.20 (3.27)	4
TR175VA001	3.801	3.790	3.163	3.141	3.264	9.5 (24.13)	7.00 (3.18)	7
TR175VA002	4.180	3.790	3.189	3.150	3.220	9.5 (24.13)	7.10 (3.22)	4
TR175VA003	4.030	3.786	3.161	3.155	3.189	8.0 (20.32)	7.44 (3.37)	1
TR240VA001	4.025	3.750	4.530	3.180	3.350	9.5 (24.13)	8.60 (3.9)	8
TR300VA002	4.526	3.750	4.500	3.187	3.859	8.5 (21.59)	11.60 (5.26)	10
TR375VA001	4.592	3.747	4.504	3.181	3.933	7.00 (17.78)	11.20 (5.08)	7



TRANSFORMER STYLES

WIRING

Primary Pigtail Wires

120 VAC	White
208 VAC	Red
240 VAC	Orange
277 VAC	Brown
480 VAC	Gray

Secondary Pigtail Wires

24 VAC	Yellow
24 VAC	Yellow/White
Supply Frequency	50/60HzA
Approvals	UL File #E197146, RoHS, CE
Warranty	1 Year

ORDERING INFORMATION

Order by transformer model as listed under Specifications on the previous page.

Low Pressure Transducer

Model PR-274/275

- **100% solid state, micro-machined, glass-on-silicon, ultra-stable capacitance sensor**
- **As low as ± 0.05"wc (± 12.5 pa)**
- **Can resolve less than 0.00001"wc (0.00025 pa)**
- **Up to 10 PSID overpressure without zero shift**
- **Up to 6 field selectable ranges in one unit**
- **Wide 12-40 VDC/12-35 VAC unregulated supply voltage**
- **Two temperature compensated output versions, 4-20 mA 2-wire or field selectable 0-5 VDC/0-10 VDC**
- **Non-interacting zero and span trimmers**
- **NIST traceable calibration**
- **Two rugged steel enclosure types NEMA 4 (IP-65) or panel mount for ease of installation**
- **Short circuit and reverse polarity protected**
- **Conforms to EMC standards EN50082-1/ EN55014/EN60730-1**

The PR-274/275 incorporates a new micro-machined glass-on-silicon (Gl-Si) capacitance sensor. This technology revolutionizes very low pressure measurement. Temperature related zero drift, calibration shift due to overpressure, non-repeatability, non-linearity, and extremely low pressure sensitivity have been some of the problems which have plagued the controls industry. The PR-274/275 with the new Gl-Si technology not only addresses all of the above shortcomings, but for the first time offers a reliable, accurate means to measure and control building/room pressure, air flow, duct pressure, filter pressure drop, or any other extremely low pressure application. Up to six field selectable direct or compound ranges, two enclosure types, field selectable outputs, fully temperature compensated NIST traceable accuracy, non-interacting zero and span adjustments, short circuit and reverse polarity protected output, and a liberal two year warranty are some of the features which make the PR-274/275 the industry's highest performance, ultra-stable, low pressure transducer.

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PR-274/275

The PR-274/275 incorporates sophisticated integrated circuits to not only provide a high level, fully conditioned and temperature compensated output, but also to offer field selectable flexibility which was unheard of in the industry. The PR-274/275 offers up to six field selectable pressure ranges in one unit. In this way, a customer does not need to know the exact pressure range prior to selection. By merely knowing the application, a unit may be selected and then later field configured for the desired pressure range. With fixed range units, in case of engineering error or incorrect selection, the only solution is expensive field recalibration or time consuming product exchange or replacement. Similarly, numerous units have to be kept in stock as spares to cover all ranges in case of field failure. The PR-274/275 with the field selectable pressure ranges in a particular application thereby eliminating the need to stock numerous fixed range units. (For a complete listing of all the ranges available, please see the ordering information section on page three.)

On VDC output units, two additional field selectable options are available: dual outputs 0-5 or 0-10 VDC, and dual unregulated supply voltages 12-35 VAC or 12-40 VDC. By merely moving a shorting plug, one can select the desired output for the specific application. As far as supply voltage is concerned, the unit automatically configures for AC or DC and no field selection is necessary. Another feature is that the output is fully protected from short circuit to ground, or if the supply voltage is applied by mistake to the output. Past experience demonstrates that field related wiring problems do occur. Instead of denying this fact, the protection circuit is designed in to ensure trouble-free start-up. The VDC output unit is also designed to handle low impedance circuits. In fact, the unit can drive up to 1k ohms minimum. In this way, multiple controllers, indicators, or other devices can be paralleled to the output without performance degradation.

The mA output units can function over a wide unregulated supply voltage range: 12-40 VDC without any effect on calibration or performance. The unit has reverse polarity protection built in. As a result, it is next to impossible to damage the unit by mis-wiring. By using sophisticated low drop-out voltage regulators and CMOS integrated circuits, the mA output unit can drive very high output impedance. In fact, with only 12 VDC supply, the unit can drive 200 ohms. At 40 VDC, the unit is capable of handling up to 1600 ohms load. In this way, the output loop can be tied in series to multiple controllers, indicators, and other devices without degrading the performance.

Automated NIST traceable pressure controllers and precision Barocel® pressure sensors are utilized to calibrate and certify the PR-274/275 transducers. Calibration data on each unit is archived digitally for SPC and QC purposes. All automated calibration systems are networked and data is available on-line to numerous individuals at the same time. In this way, extremely high standards of quality and calibration integrity are maintained. Each unit is individually temperature compensated in an environmental chamber. The temperature compensation data is also digitized and archived for future reference purposes. Compensating each unit individually ensures that published specifications are adhered to.

Due to low mass of the micro-machined capacitance Gl-Si sensor, the mounting orientation error for ranges higher than 1.0"wc (250 pa) is negligible. For extremely low ranges, if the unit is installed as indicated on the label, there should be no orientation error. However, due to space limitation, if the unit cannot be installed in the indicted position, the error can be easily removed by merely adjusting the zero trimmer. Since the zero and span trimmers are non-interactive, adjustment to the zero should under no circumstance affect the calibration integrity of the unit including linearity and repeatability specifications across the range.

The PR-274/275 is available with two packaging options: a NEMA 4 (IP-65) fully gasketed, dust proof and splash proof enclosure, or a lightweight but rugged panel mount chassis for ease of installation with minimum space requirement in a control panel. The NEMA 4 (IP-65) enclosure has an external mounting bracket to facilitate field installation. A 1/2" (.875"/22.25mm dia.) knock-out for conduit connection is also provided. A liquid tight cable connector is also supplied if the unit is not being hard wired. Once installed, the enclosure maintains its environmental rating and protects the electronics and the sensing element from condensation, corrosive contaminants and other environmental pollutants. Both packaging options also have additional features for ease of installation, including unpluggable terminal blocks, rugged brass hose barbs, easily accessible zero and span trimmers, and conveniently located shorting plugs for field selection.

PR-274/275

Specifications:

Accuracy*: ± 1% FS

Overpressure: 10 PSID

Supply Voltage: 12-40 VDC
12-35 VAC (VDC output units only)

Supply Current: VDC Units - 10 mA max.
mA Units - 20 mA max.

Enclosure: 18 Ga C. R. Steel NEMA 4 (IP-65) or Panel Mount Chassis

Finish: Baked on enamel-PMS2GR88B

Compensated Temp Range: 25℉-150℉ (-4℃-65℃)

T. C. Error: ±0.0125%/℉ (.02%/℃)

Operating Temp Range: 0℉-175℉ (-18℃-80℃)

Media Compatibility: Clean dry air or any inert gas

Environmental:10-90%RH Non-Condensing

Termination: Unpluggable screw terminal block

Wire Size: 12 Ga max.

Load Impedance: 1.6K ohms max. at 40 VDC (mA output units) 1K ohms min. (VDC output units)

Weight: Enclosure 1.0 lbs. (.45 kg),

Panel Mount: 0.5lbs. (.25 kg)

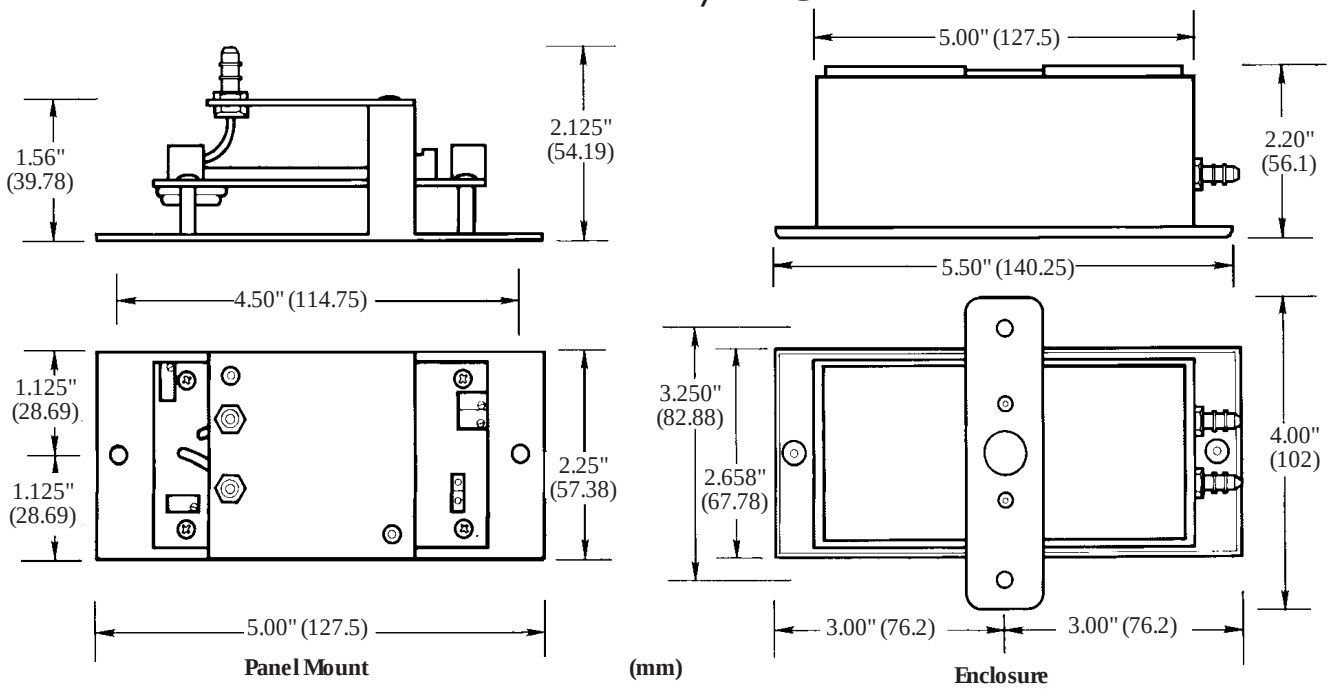
**Includes non-linearity, hysteresis and non-repeatability*

Ordering Information: PR-

PACKAGING	RANGE		OUTPUT	
274 (enclosure)	**Rl** ("wc)	0 T O 0. 10 / -0.05 TO + 0.05	**mA**	(4-20 mA 2 wire)
275 (panel mount)	**R2** ("wc)	0 TO 1.0 / 0 TO 0.5 / 0 TO0.25/ -0.5 TO + 0.5 / -0.25 TO + 0.25/ -0.125 TO + 0.125	**VDC**	(0-5 VDC or 0-10VDC field selectable)
	R3 ("wc)	0 TO 5.0 / 0 T O2.5 / 0 TO1.25/ -2.5 TO +2.5 / -1.25 TO + 1.25/ -0.625 TO + 0.625		
	R4 ("wc)	0 T O 30 / 0 TO 15 / 0 TO 7.5/ -15.0 TO + 15.0 / -7.5 TO +7.5/ -3.75 TO + 3.75		
	R5*(pa)	0 TO 25 / -12.5 TO + 12.5		
	R6*(pa)	0 TO 250 / 0 TO 125 / 0 TO 62.5/ -125 TO + 125 / -62.5 TO + 62.5/ -31.25 TO + 31.25		
	R7*(pa)	0 TO 1250 / 0 TO 625 / 0 TO 312.5/ -625 TO + 625 / -312.5 TO + 312.5/ -156.25 TO + 156.25		
	R8*(pa)	0 TO 7500 / 0 TO 3750 / 0 TO 1875/ -3750 TO + 3750 / -1875 TO + 1875/ -937.5 TO + 937.5		

Example: PR-274-R2-mA: Enclosure unit with R2 Range which has six (6) field selectable range options and 4-20 mA output.

PR-274/275



WARRANTY: MAMAC Systems, Inc. warrants its products to be free of defects in material and workmanship for a period of two (2) years from date of shipment. If a unit is malfunctioning, it must be returned to the factory for evaluation. A return authorization number (RMA) will be issued by the customer service department and this number must be written or prominently displayed on the shipping boxes and all related documents. The defective part should be shipped freight pre-paid to the factory. Upon examination by MAMAC Systems, Inc., if the unit is found to be defective, it will be repaired or replaced at no charge to the customer. However, this warranty is void if the unit shows evidence of being tampered with, damaged during installation, misapplied, misused, or used in any other operating condition outside of the unit's published specifications.

MAMAC Systems, Inc. makes no other warranties or representations of any kind whatsoever, expressed or implied, except that of title. All implied warranties including any warranty of merchantability and fitness for a particular purpose are hereby disclaimed. User is responsible to determine suitability for intended use.

LIMITATIONS OF LIABILITY: The remedies of buyer set forth herein are exclusive and the total liability of MAMAC Systems, Inc. with respect to this order, whether based on contract, warranty, negligence, indemnification, strict liability or otherwise, shall not exceed the purchase price of the product upon which liability is based. **In no event shall MAMAC Systems, Inc. be liable for consequential, incidental or special damages.** MAMAC Systems, Inc. reserves the right to change any specifications without notice to improve performance, reliability, or function of our products.

Every precaution for accuracy has been taken in the preparation of this manual, however, MAMAC Systems, Inc. neither assumes responsibility for any omissions or errors that may appear nor assumes liability for any damages that result from the use of the product in accordance with the information contained in the manual.

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