I/A Series®

MICROFLO II™ Product Family

The Invensys MICROFLO II family of direct digital controllers (DDC) is compatible with pressure independent and pressure dependent variable air volume terminal box applications. The MICROFLO II controllers operate in a stand-alone mode providing accurate zone temperature control and can be integrated into a facility-wide BAS/DDC system by utilizing the I/A Series family of controllers. Invensys Building Systems provides an integrated Building Automation System capable of meeting the tough control strategies of today's VAV Air Systems. The MICROFLO II family of controllers may be applied to new VAV terminals or retrofitted to existing electric, electronic or pneumatic actuated air terminals. Models of the MICROFLO II family support standard butterfly damper terminal boxes, pneumatic terminal boxes and boxes with existing integral actuators. In addition, the MICROFLO II family of controllers provides compatibility with all types of terminal box and radiation reheat, along with integrated zone lighting control, helping to make the MICROFLO II family the most comprehensive line of DDC VAV terminal box controllers available in today's market.

Features —

- Built-in applications with adjustable options provide compatibility with the wide variety of terminal boxes available in today's market.
- Direct digital control (DDC) eliminates long-term recalibration maintenance cost.
- Integral packaging combines actuator, transducer and controller into one attractive and highly functional package to increase reliability and reduce maintenance costs.
- Personal System Interface provides the user with the industry's most advanced and easiest to use hand-held interface.
- Personal System Interface terminal jack option at wall sensor provides VAV box setup, adjustment of controller functions, and simple "Air Balancing."
- Flexible device configurations allow spare or unused output points to be used for control of local lighting, motorized shades, or other applications external to the terminal box.
- Direct digital control algorithms allow selection of proportional or proportional-integral control independently for the cooling and heating sections.
- Standard sequence for morning warmup using primary air when used with a heat/cool VAV AHU.
- Reheat options are integral to controller for application to all types of terminal box and perimeter reheat.
- Optional local pushbutton override at wall sensor provides timed override of unoccupied conditions and enables start up of central system and zone lighting.
- Local space setpoint provides occupants with traditional control of their own comfort settings.
- High accuracy wall and duct sensors allow startup and damage replacement without recalibration.
- Up to four controllers may be controlled in parallel from one sensor and setpoint for homogenous control of zones served by multiple VAV air terminals.
- Through the use of extensive onboard software diagnostics, troubleshooting time is minimized.
- Facility-wide monitoring, alarming, load shed control, Global Control Strategies, and information management are available through the I/A Series family of DDC controllers.
- Building managers have the option of remote override of occupant settings to improve energy and operating efficiency.
- Occupied/unoccupied mode changeover is compatible with a local time clock or globally through the I/A Series.

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- Tenant utility cost allocation are available when MICROFLO II is integrated with the I/A Series BAS.
- Maintenance scheduling on terminal units is easily implemented when integrated with the I/A Series BAS.
- Through the I/A Series Universal Network Controller, the MICROFLO II controller is fully configurable, allowing automatic downloading and uploading of controller configuration.

Table-1 Model Chart.

Model	Description
MF2-PIC	Pressure Independent, Cooling only, with internal actuator
MF2-PID	Pressure Independent, Deluxe (4 DO, 1 AO), with internal actuator
MF2-PIT	Pressure Independent/Dependent, Deluxe (4 DO, 1 AO), with Triacs for external actuator drive
MF2-PIP	Pressure Independent/Dependent, Deluxe (4 DO, 1 AO), with analog output for pneumatic primary actuator through I/P transducer

Hardware Specifications

Dimensions 6.75 in. H x 8 in. W x 4 in. D (171 mm x 203 mm x 102 mm).

Enclosure Conforms to NEMA-1. Meets UL 94-5V flammability ratings for plenum application use.

Conduit Knockouts 7 knockouts for 1/2" conduit provided.

Power Supply Input 20 to 30 Vac, 50/60 Hz.

Maximum Power Consumption 40 VA for MF2-PIT, 20 VA for all other models.

Agency Approvals

UL-873 File #E9429 Category XAPX.

CSA File #LR 3728.

FCC Part 15 Class B.

UL-864 File #S5381 Category UUKL.

Transient Compliance Tests (ANSI C62.41) IEEE-587, Category A,B.

Electrostatic Discharge Test ±15 kV to case, ±5 kV to field wiring terminals.

Ambient Limits

Temperatures

Operating 40 to 140 °F (4 to 60 °C).

Shipping and Storage -40 to 160 °F (-40 to 71 °C).

Humidity 5 to 95% non-condensing.

Microprocessor 83C196.

Memory 8 KB of ROM, 1 KB of EEPROM.

Diagnostic Display LED indication of operational status.

Wiring Terminals Screw terminals accepting 14 to 24 AWG wire. Use copper conductors only.

Velocity Pressure Input

Operating Range -0.20 to 2.10 in. of W.C. (-0.05 to +0.523 kPa).

Control Range 0.01 to +2.00 in. of W.C. (0.0025 to +0.497 kPa).

Accuracy ± 5% V.P. ±0.005 in. W.C. (0.07 to +2.00 in. of W.C.). Laminar flow at 25 °C.

Sensor Type Flow sensor (differential pressure).

Tubing Connection Barb fittings for 1/4" O.D. FRPE polyethylene tubing or 1/8" I.D. tygon tubing (high and low pressure taps).

Tubing Length 5 feet maximum each tube (Static Pressure feet maximum).

Inputs

Space Temperature 40 to 95 °F (4 to 35 °C).

Local Setpoint 55 to 85 °F or 10 to 30 °C.

Auxiliary Air Temperature 40 to 140 °F (4 to 60 °C).

Contact Status Input For stand-alone occupancy control or remote status monitoring of local status condition (dry contact).

Momentary Pushbutton Override (optional) At wall sensor.

Cooling Throttling Range Adjustable 1 to 15 °F.

Heating Throttling Range Adjustable 1 to 15 °F.

Integral Actuator Model Outputs (-PIC, -PID)

Damper Linkage 1/2" or 3/8" round shaft extending 3/4" min. from terminal box (3/8" round shaft requires AM-135 adaptor kit).

Torque Rating 30 lb-in. (3.4 N-m).

Timing 3 minutes for 90° rotation under continuous drive.

Damper Control

Minimum Flow/Position Setting Adjustable Flow (CFM) or 0 to 100%.

Maximum Flow/Position Setting Adjustable Flow (CFM) or 0 to 100%.

Mechanical Travel Limit Adjustable 90 to 45° (factory set for 90°).

External Actuator Model Outputs (-PIT, -PIP)

-PIT Triac outputs (2) rated @ 24 Vac, 0.75 A to drive external bi-directional synchronous motor.

-PIP 4-20 mAdc into a 200 to 500 Ω load impedance for interface to I/P transducer or electronic analog actuator.

Analog Outputs (-PID, -PIT, -PIP)

Quantity

-PID, -PIT 1.

-PIP 2 (1 for Primary Damper Operation).

Type 4-20 mA, into a 200 to 500 Ω load impedance for interface to modulating hydronic valves, fan speed controller and pneumatic I/P transducer.

Digital Outputs (-PID, -PIT, -PIP)

Quantity 4.

Contact Ratings 28.8 VA @ 24 Vac or 144 VA @ 120 Vac, Form A (SPST-N.O.) pilot duty relays for control of fan starters, electric heat, modulating actuator, lights and other loads.

Software Specifications

Control Functions Refer to Table-2.

Table-2 MICROFLO II Control Strategies, Pressure Independent or Pressure Dependent.

Box Configuration	Reheat Type
• Cooling • Series Fan • Parallel Fan • Induction • Static Pressure • Double Duct (PI/PD)	• Staged Electric • Time Proportional Electric • Floating (Modulating) Proportional Hydronic • Proportional Hydronic • Staged Leading Proportional • Proportional Leading Staged • Proportional Leading Proportional

Communications

ASD Bus RS-485 at 19,200 baud.

Personal System Interface RS-485, 19,200 baud. Plug into RJ-12 jack at wall sensor location. Communications supported to all ASD devices within network. Permits reconfiguration, monitoring, air balance, and editing of all MICROFLO II configuration data.

Sensor Models

TSMN-57011-850	Wall sensor
TSMN-90220-850	Wall sensor with PSI communications jack
TSMN-90230-850	Wall sensor with PSI communications jack, and push button override
TSMN-90250-850	Wall sensor with PSI communications jack, push button override, and remote setpoint (55 to 85 °F)
TSMN-90250-852	Wall sensor with communications jack, push button override, and remote setpoint (10 to 30 °C)
TS-5721-854	Duct probe

Personal System Interface

LAPT-80800 (See F-24317)	Personal System Interface software

Accessories

AD-8969-206	11 kΩ shunt resistor for use with TS-57XXX sensors
AM-135	3/8” to 1/2” shaft adaptor
PC-301	Air flow switch (for Electric Reheat Flow Interlock)

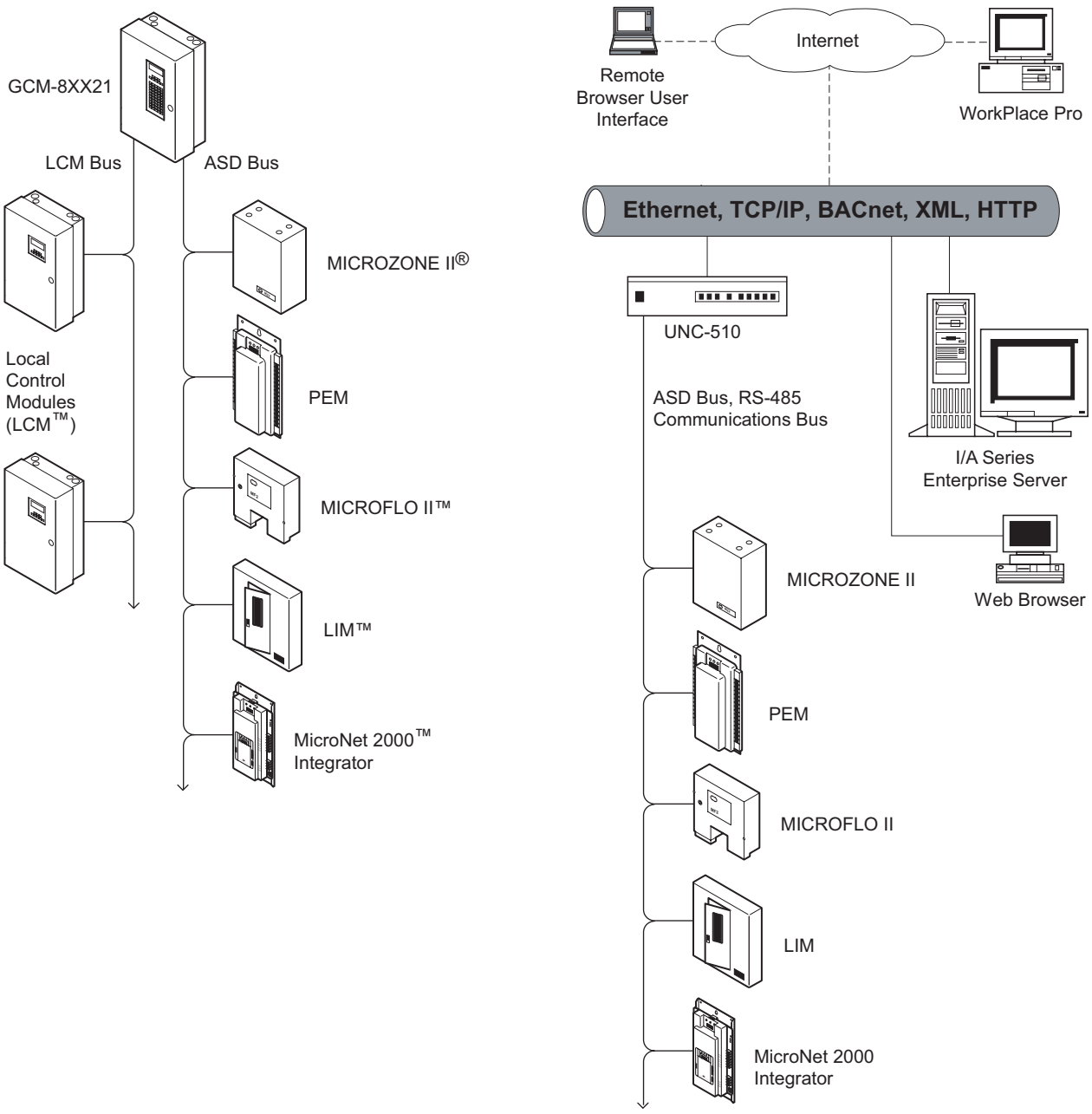

Figure-1 MICROFLO II with Other ASD Devices in the I/A Series System.