MICRO^3

Programmable Logic Controller

TREICHL-ATM Electronic
Auf der Bült 10 - 12
D 41189 Mönchengladbach

Tel. 02166 958545
Fax 02166 958547
eMail: ATM@Treichl.de
internet: http://www.treichl.de

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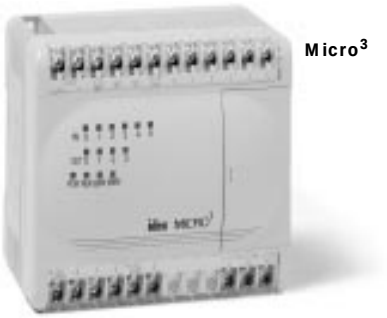
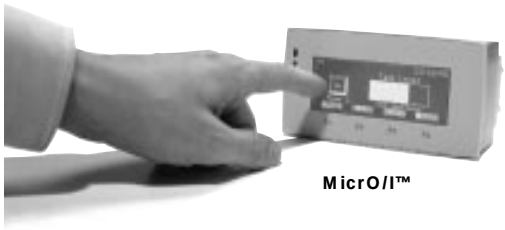


Micro^3

WindLDR™



MicrO/I™

FA3S

Micro-1 with Program Loader

FA2J

Micro^{3}C

The True Micro PLC Ambassador

Key features of the Micro^{3}C include:

- All the features of the Micro^3
- Talks both ASCII and binary
- Equipped with two serial ports, RS232 and RS485
- Capable of connecting to dial-up modem, serial printer, and bar code reader
- Up to 500 data registers
- Handles a wide range of analog input signals
- Comes with an easy reset button
- Available in 2 sizes: 16- and 24-I/O with relay output

UL Listed
File No. E102542

CSA Certied
File No. LR66809

CE Certied
EMC Approved
File No. B950913332312

Micro^3

The Benchmark for Micro-PLCs

Key features of the Micro^3 include:

- Built-in communications and networking
- Input/output analog capability
- User program password protection
- Catch input, pulse output
- Real-time clock and calendar available
- Built-in power supply for sensors
- Arithmetic, comparison, and Boolean computation
- High-speed: 400µ/100 steps, 10kHz

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		Standard Mode	High-Speed Mode
General Specifications	**Program Capacity**	1012 steps	100 steps (approximately)
	Processing	2.9ms/1k steps (average)	400µs/100 steps (average)
	Internal Relay	232 points	40 points
	Data Register	Micro^3: 100 points Micro^{3}C: 500 points	32 points
	Control Data Register	10 points	—
	Counter/Timer	32 points total	16 points total
	Shift Register	64 points	32 points
	Communication Channel	Data link channel: RS485 Baud rate: 19,200 bps (xed) Cable length: 656' (200m) (maximum) Data link: 6 slave stations (maximum) Expansion: 1 unit (maximum)	—
		Programming channel: complies with EIA RS485 (Micro^3)/RS232 (Micro^{3}C) standards Baud rate: 1,200/2,400/4,800/9,600/19,200 bps (selectable); Extension: 16.4' (5m) (maximum)	
	Instructions	Micro^3: 22 basic, 33 advanced Micro^{3}C: 22 basic, 35 advanced	
	Memory	EEPROM	
	I/O	See congurations shown on page J-6	
	Catch Input Relays	8 points	
	Special Internal Relay	16 points	
	Power Failure Protection	Internal relay, shift register, counter, data register; backup time, lithium battery fully charged— With clock: 30 days at 25°C (approximately); Without clock: 50 days at 25°C (approximately)	
	Self-Diagnostic Function	CPU error (WDT), user program CRC error, user program sum check error, communication error, sensor power overload, transistor output overload	
	Catch Input	8 points; Minimum detectable pulse width (when Iter is set to 10); Input I0 ON pulse = 28 µs, OFF pulse = 30µs; Inputs I1 to I7 ON pulse = 37µs, OFF pulse = 120µs (depending on input Iter settings)	
	Input Filter Function (DC input type only)	Normal input: 0ms, 3ms, 7ms, 10ms; Catch input: Input I0 ON pulse = 4 to 616µs, OFF pulse = 6 to 618µs; Input I1 to I7 ON pulse = 20 to 625µs, OFF pulse = 120 to 618µs	
	High-Speed Counter	1 point, single-phase, 10kHz (maximum), 32 bits	
	Analog Potentiometer	Micro^3: 1 point (10-point), 2 points (16-, 24-point) Micro^{3}C: 1 point only	
	Pulse Output	1 channel, frequency/PWM output (not available in Micro^{3}C)	
	Real Time Clock	Clock accuracy ±30s/month (maximum) at 25°C (typical); year, month, day, hour, minute, second	
	Sensor Power Supply	24V ±3.6V DC, 150mA (maximum) including input current, overload detected	

Micro^{3}C only available in 16 I/O or 24 I/O.

		AC Power	DC Power
Electrical Specifications	**Rated Power Range**	100 to 240V AC, 50/60Hz (85 to 264V)	24V DC (19 to 30V DC)
	Power Consumption	Approximately 30VA (240V AC)	Approximately 14W (24V DC)
	Inrush Current	40A (maximum)	
	Power Disruption	25ms (momentary disruption) allowed	
	Dielectric Strength	Between power terminal and ground: 2,000V AC, 1 minute	Between power terminal and ground: 1,500V AC, 1 minute
		Between I/O terminal and ground: 1,500V AC, 1 minute	
	Temperature	Operating: 0 to 60°C, Storage: –20 to +70°C	
	Operating Humidity	45 to 85% RH (avoid condensation)	
	Vibration Resistance	5 to 55Hz, 6G, 2 hours in each of 3 axes	
	Shock Resistance	30G, 3 shocks in each of 3 axes	
	Noise Resistance	Between power terminal and ground: 1.3kV, 1µs; Between I/O terminal and ground: 1kV, 1µs (with noise simulator) — complies with IEC1131-2	
	Insulation Resistance	Between power or I/O terminal and ground: 10MΩ (minimum), 500V DC	
	Ground Resistance	100Ω (maximum)	

Part Numbers: Micro^3

Item		Part No.	Description	Remarks
100 to 240V AC 50/60Hz Power Micro^3 CPU	Output: Relay 240V AC, 2A 30V DC, 2A	FC2A-CA16A1	16 I/O: 9 inputs and 7 outputs	Inputs: 120V AC (85-132V AC) 50/60Hz (housing = 24 I/O size)
		FC2A-C10A1 FC2A-C16A1 FC2A-C24A1	10 I/O: 6 inputs and 4 outputs 16 I/O: 9 inputs and 7 outputs 24 I/O: 14 inputs and 10 outputs	Inputs: 24V DC sink/source Only the 16- and 24-I/O units have real-time clock/calendar
	Output: Transistor Sink 24V DC, 0.5A	FC2A-C10B1 FC2A-C16B1 FC2A-C24B1	10 I/O: 6 inputs and 4 outputs 16 I/O: 9 inputs and 7 outputs 24 I/O: 14 inputs and 10 outputs	
24V DC Power Micro^3 CPU	Output: Relay 240V AC, 2A 30V DC, 2A	FC2A-C10A4 FC2A-C16A4 FC2A-C24A4	10 I/O: 6 inputs and 4 outputs 16 I/O: 9 inputs and 7 outputs 24 I/O: 14 inputs and 10 outputs	
	Output: Transistor Sink 24V DC, 0.5A	FC2A-C10B4 FC2A-C16B4 FC2A-C24B4	10 I/O: 6 inputs and 4 outputs 16 I/O: 9 inputs and 7 outputs 24 I/O: 14 inputs and 10 outputs	
	Output: Transistor Source 24V DC, 0.5A	FC2A-C10D4 FC2A-C16D4 FC2A-C24D4	10 I/O: 6 inputs and 4 outputs 16 I/O: 9 inputs and 7 outputs 24 I/O: 14 inputs and 10 outputs	
Programming Starter Kits "Micro Mania"		MM-MICRO1 MM-MICRO3-10 MM-MICRO3-16 MM-MICRO3-24 MM-MICRO3C-16 MM-MICRO3C-24 MM-Cables	Micro-1 PLC, WindLDR, computer link cable, input switch simulator Micro^3 10 I/O, WindLDR, computer link cable, input switch simulator Micro^3 16 I/O, WindLDR, computer link cable, input switch simulator Micro^3 24 I/O, WindLDR, computer link cable, input switch simulator Micro^{3}C 16 I/O, WindLDR, computer link cable, input switch simulator Micro^{3}C 24 I/O, WindLDR, computer link cable, input switch simulator WindLDR, 3 computer link cables for Micro-1, Micro^3 and Micro^{3}C	
Program Loader		FC2A-HL1EC	Program loader with cable	
Loader Cable		FC2A-KL1 FC2A-KL2	6.56' (2m) long 16.4' (5m) long	Connects program loader to Micro^3
Loader Adaptor		PSR-GA05005	5V power supply adaptor for using program loader when not connected to CPU	
Computer Link Cable		FC2A-KC2	Connects Micro^3 or loader to PC (1:1 link), 6.56' (2m)	
Memory Card		FC2A-MC1	Used with program loader to store user programs in SRAM memory	
Expansion Cable		FC2A-KE1	Close proximity Micro^3 link expansion, 9.84" (250mm) long	
1:N Computer Link Interface Unit		FC2A-LC1	One required to connect each Micro^3 in a 1:N computer link system (all connected to one central RS232C/RS485 converter)	
1:N Computer Link Interface Cable		FC2A-KC3	One required to connect each Micro^3 in a 1:N computer link system (connected to each interface unit), 32.8' (10m) long	
1:N RS232C/RS485 Converter		HD9Z-T11	One required to connect all Micro^3 units in a 1:N computer link system	
1:N RS232C/RS485 Converter		HD9Z-T11-DS783	One required to connect all Micro^3 units in a 1:N computer link system; Additionally, the DS783 should be used in applications requiring PC to Micro^3 communications via modem	
1:N PC Cable		HD9Z-C52	Connects RS232C/RS485 converter to PC in a 1:N computer link system, 4.92' (1.5m) long (D-sub 9-pin female computer connector)	
Analog Input Unit		FC2A-AD1 FC2A-AD2 FC2A-AD3 FC2A-AD4 FC2A-AD5	0 to 5V 0 to 10V ±5V 4 to 20mA ±10V	Converts analog signals to digital and sends to input I0 of Micro^3 (not for use with AC input type units)
Analog Output Unit		FC2A-DA1 FC2A-DA2 FC2A-DA3 FC2A-DA4 FC2A-DA5	0 to 5V 0 to 10V ±5V 4 to 20mA ±10V	Converts digital (PWM) signal from output Q0 of Micro^3 to analog (not for use with relay output type units)
Analog Timer Unit		PFA-1U11	For ne adjustment of analog timer preset value	
Input Switches		FC2A-SW6 FC2A-SW9 FC2A-SW14	Input simulator switches (6) for 10 I/O Micro^{3}s Input simulator switches (9) for 16 I/O Micro^{3}s Input simulator switches (14) for 24 I/O Micro^{3}s	
WindLDR™, Version 1.0		WINDLDR	Windows-based application software, performs ladder programming and monitors IDEC's Micro-1, Micro^3, and Micro^{3}C PLCs (soon: available for FA series)	
CUBIQ, Version 2.0		FC9Y-LP1E314	DOS-based application software, performs ladder programming and monitoring; supports Micro^3 and Micro^{3}C PLCs only	

Part Numbers: Micro^{3}C

Item	Part No.	Description	
AC Power (100 to 240V AC, 50/60Hz power supply)	FC2A-C24A1C	Base units: Input (24V DC sink/source) Relay output (240V AC/30V DC, 2A)	24 I/O (14 in, 10 out)
	FC2A-C16A1C		16 I/O (9 in, 7 out)
DC Power (24V DC, 19 to 30V DC)	FC2A-C24A4C		24 I/O (14 in, 10 out)
	FC2A-C16A4C		16 I/O (9 in, 7 out)
Program Loader	FC2A-HL1EC	Version 2.0+; also compatible with Micro^{3}C	

Optional Item	Part No.	Description
Loader Cable (2m)	FC2A-KL3C	Connects basic unit (loader port) and program loader
Loader Cable (2m)	FC2A-KL4C	Connects basic unit (data link terminal) and program loader
Modem Cable (3m)	FC2A-KM1C	Connects basic unit (loader port) and modem (1:1 communications)
PC Interface Cable (3m)	FC2A-KC4C	Connects basic unit (loader port) and PC (1:1 communications)
PC Interface Cable (2m)	FC2A-KC6C	Connects basic unit (data link terminal) and PC (1:1 communications)
User Communication Cable (2.4m)	FC2A-KP1C	Connects basic unit (loader port) and user's equipment
PC Connect Cable (5m)	HG9Z-XC183	Connects basic unit (loader port) and Micro O/I™
Memory Card (RAM)	FC2A-MC1	Memory to store user's programs (64K)
AC Adaptor	PSR-GA05005	Connects basic unit (data link terminal) and program loader/PC
Expansion Cable (25cm)	FC2A-KE1	Connects basic unit and expansion function unit
1:N Link Adaptor	FC2A- MD1	Connects basic unit (data link terminal) and PC
RS232C Cable (4 lines, 1.5m)	HD9Z-C52	Connects link adaptor and PC (1:N communications), D-sub 9-pin
WindLDR™, Version 1.0	WINDLDR	Windows-based application software, performs ladder programming and monitors IDEC's Micro-1, Micro^3, and Micro^{3}C PLCs
CUBIQ, Version 2.0	FC9Y-LP1E314	DOS-based application software, performs ladder programming and monitoring; also compatible with the Micro^3

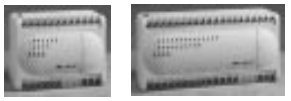
Micro^{3}C I/O Expansion

16  9 Inputs
7 Outputs

1. These Micro^{3}C expansions listed are examples. You may create your own combinations as well.

24  14 Inputs
10 Outputs

32  18 Inputs
14 Outputs

40  23 Inputs
17 Outputs

48  28 Inputs
20 Outputs

Micro^3 I/O Expansion

10  6 Inputs
4 Outputs

2. These Micro^3 expansions listed are examples. You may create your own combinations as well.

16  9 Inputs
7 Outputs

20  12 Inputs
8 Outputs

24  14 Inputs
10 Outputs

26  15 Inputs
11 Outputs

32  18 Inputs
14 Outputs

34  20 Inputs
14 Outputs

40  23 Inputs
17 Outputs

48  28 Inputs
20 Outputs

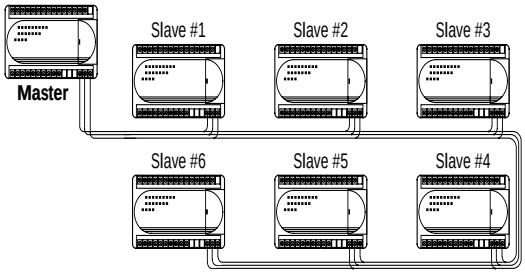
Micro^3 and Micro^{3}C Data Link

A data link network is simple to set up. No special cables or junctions are required. Just wire up to 6 Micro^{3}s or Micro^{3}Cs in a bus conguration, over a total distance of 656' (200m).

Using a built-in data link, the master initiates communication automatically—no special programming is required. Values from 2 read registers and 2 write registers are exchanged between the master and each slave.

Data link channel 19200, RS485 is xed.

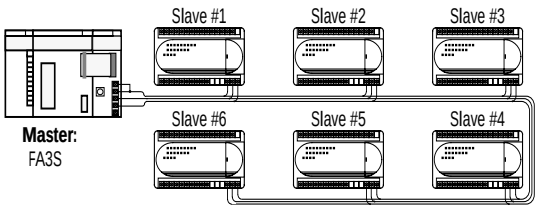
3. The expansion link and data link cannot be used concurrently.



Micro^3 and Micro^{3}C Link with FA3S Master

A high-performance FA3S CPU an PF3S-SIF4 interface module can manage data transfer with up to 6 Micro^{3}s. Two interface modules can be used with each FA3S CP12 or CP13, making it possible to network up to 12 Micro^{3}s total.

Using a built-in data link, the master initiates communication automatically when executing a network communication program. Values from 2 read registers and 2 write registers are exchanged between the master and each slave.

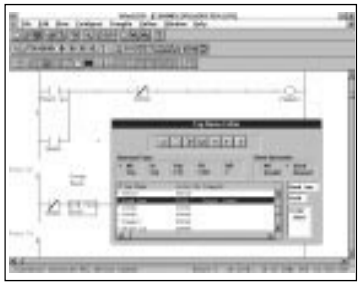


WindLDR™ Software Package

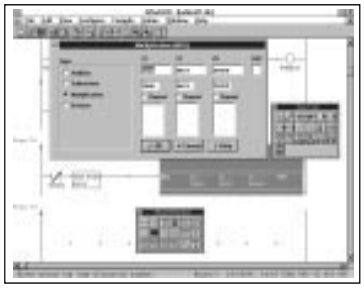
WindLDR combines the logic of ladder programming with the intuitive approach of a Windows environment. IDEC provides the ideal PLC programming and monitoring solution.

IDEC's WindLDR™ includes all the advantages of our CLIP and CUBIQ software, plus a Window-based, graphic interface. With extensive new features such as an icon-driven toolbar, on-line help, debugging tools, and an enticingly low price, there is no question—WindLDR is the answer.

Currently, WindLDR supports the programming conguration for IDEC's Micro-1, Micro^3, and Micro^{3}C PLCs. With plans to congure all of IDEC PLCs, WindLDR is the bridge between older applications' software/hardware and future generations of IDEC PLCs.



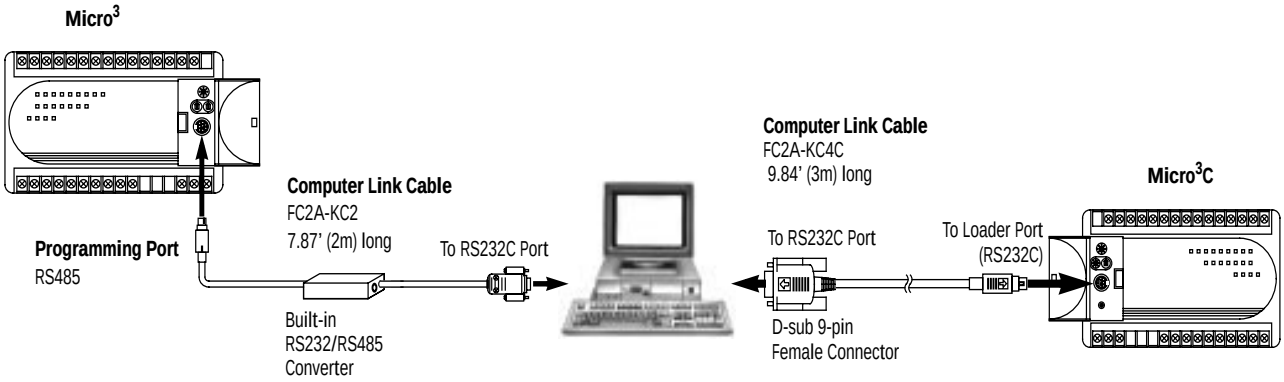
Tag Name Editor



Advanced Instructions
Multiplication (MUL)

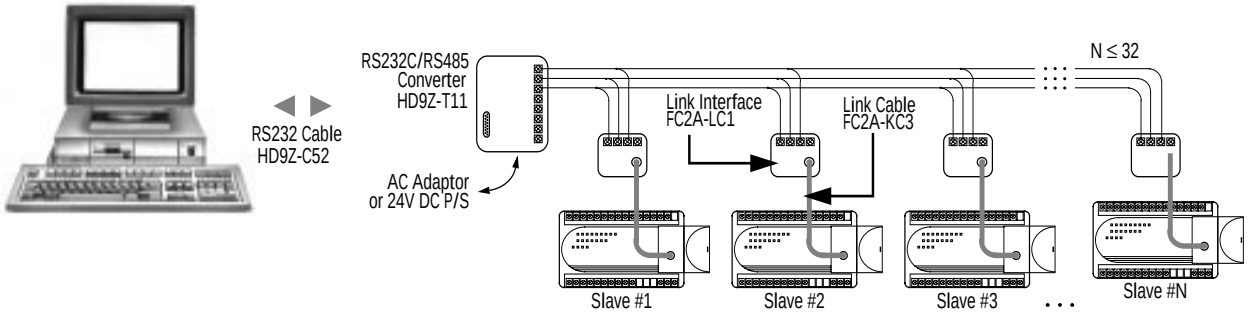
Computer Link 1:1 Communication

The Micro^3 and Micro^{3}C can be programmed from a PC using WindLDR ladder programming software. A computer link cable is required to connect the PC's RS232 serial port with the Micro's programming port.



Computer Link 1:N Communication (Micro^3 only)

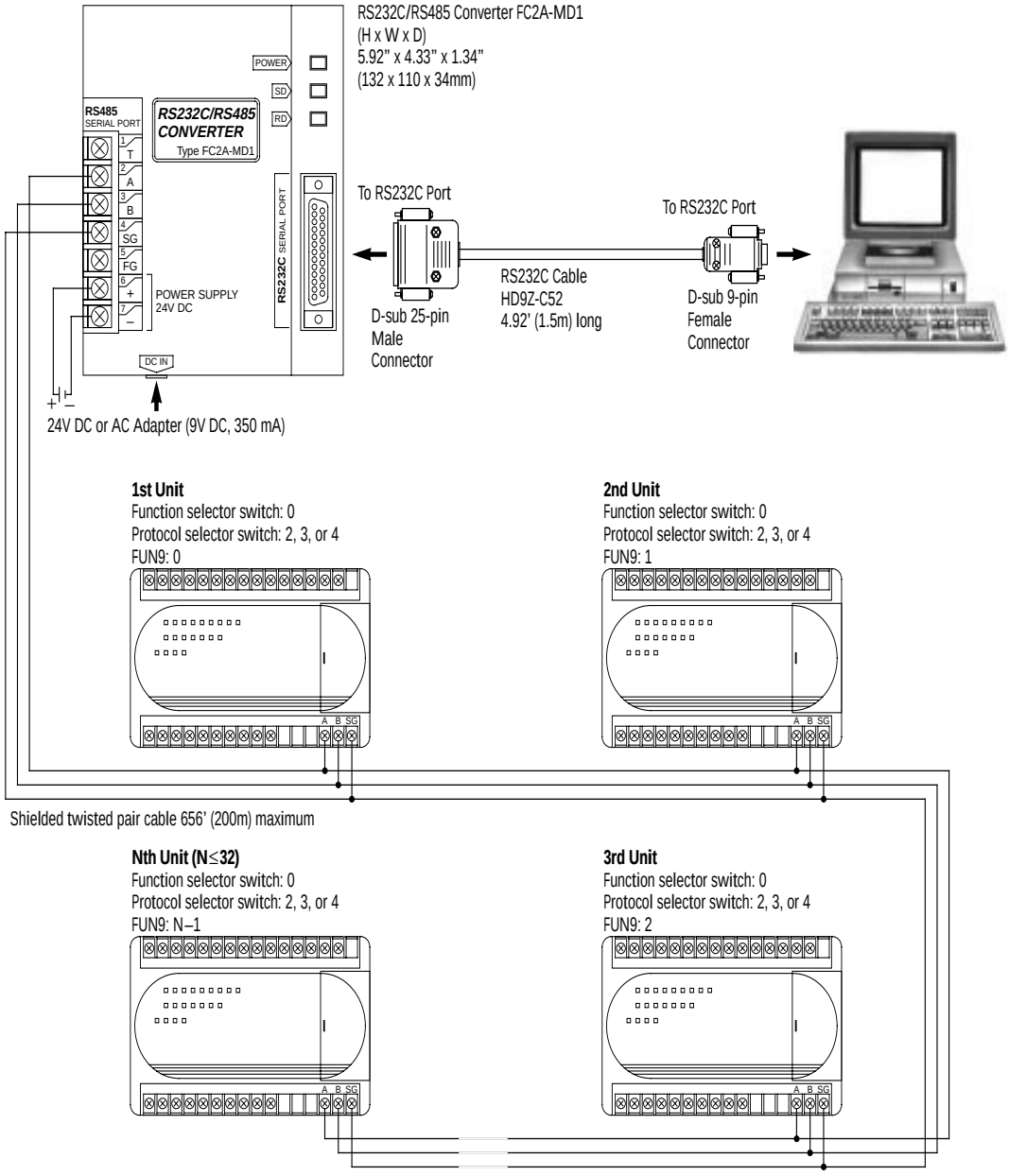
A network of Micro^{3}s can be set up for programming and monitoring with WindLDR. The network can also be used for supervisory control and data acquisition (SCADA). Up to 32 Micro^{3}s can be networks with a PC as the master. Each Micro^3 should be programmed with a specic device number in FUN9. FUN9 can be set with a program loader or with a PC in 1:1 mode running WindLDR.



Computer Link 1:N Communication (Micro^{3}C only)

To set up a 1:N computer link system, connect your PC to the RS232C/RS485 converter using RS232C cable HD9Z-C52. Connect the RS232C/RS485 converter to Micro^{3}C units using shielded twisted pair cables.

Supply power to the RS232C/RS485 converter by connecting a 24V DC source to terminals 6 and 7 or by plugging an AC adapter to the DC IN jack.



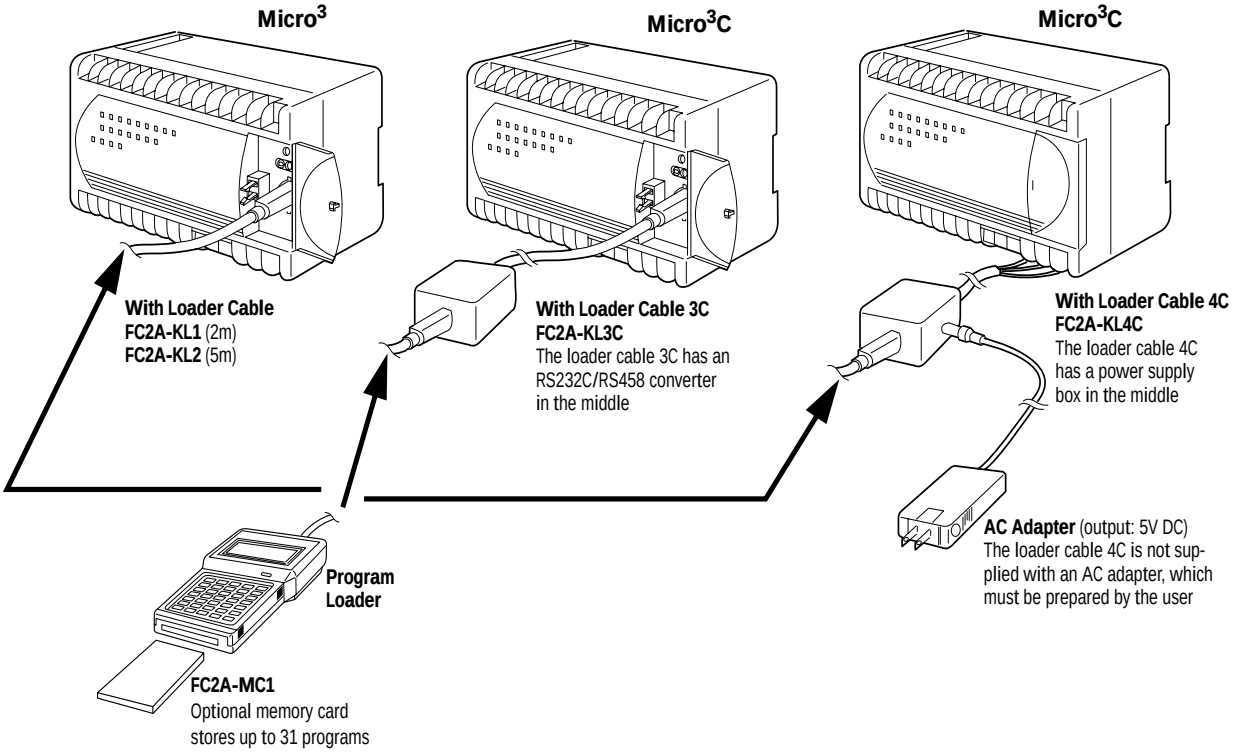
Program Loader

Micro^3 programs can be created or modied with the hand held program loader. The loader programs in Boolean commands and displays four lines. It can be programmed by using a PC or off line with a 5 volt adaptor (PSR-GA05005). The loader also can be used to monitor and change all internal registers including timers and counters. An optional SRAM memory card can also be used with the loader to store up to 31 programs with alphanumeric le names.

Specifications

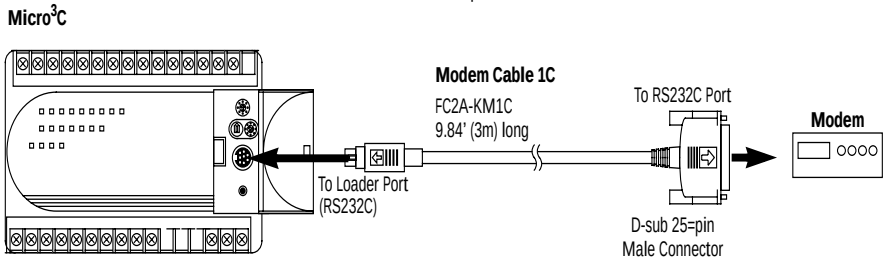
Display	4 lines × 16 characters Back-lit LCD with auto turn-off
Program Key	35 keys
Control Switch	RUN/STOP for Micro operation
Power Supply	From Micro through loader cable; From AC adaptor (5 to 6.5V DC, 4W) during off-line programming
Power Consumption	1.5W
Connection to Micro^3	Loader cable FC2A-KL1, 6.56' (2m) or FC2A-KL2, 16.4' (5m)
Connection to Micro^{3}C	Loader cable to RS232 loader port FC2A-KL3C
Connection to Micro^{3}C	Loader cable to RS485 data link port FC2A-KL4C
Power Failure Protection	Approximately 1 hour at 25°C
User Program Storage	SRAM memory card stores up to 31 programs
Operating Temperature	0 to 50°C
Weight	Approximately 300g
Dimensions (HxWxD)	7.283" × 3.740" × 1.181" (185 × 95 × 30mm)

Program Loader Cables for Micro^3 and Micro^{3}C



Micro^{3}C: Connecting the Modem through the Loader Port

To connect a modem to the loader port on the Micro^{3}C, use the modem cable 1C (FC2A-KM1C). Set the protocol selector switch to 1 or 3 to select user protocol for the loader port.



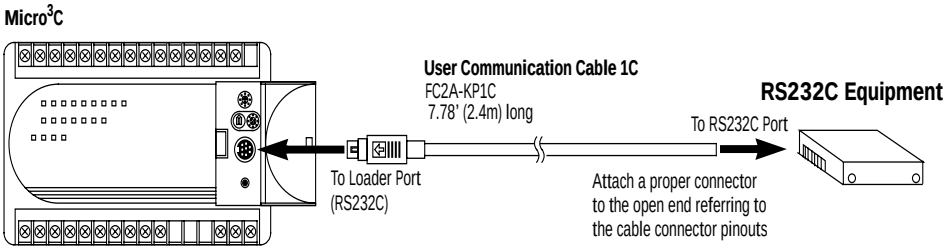
Cable Connector Pinouts

Pin	Description	
1	FG	Frame Ground
2	TDX	Transmit Data
3	RXD	Receive Data
4	RTS	Request to Send
5	—	—
6	—	—
7	SG	Signal Ground
8	DCD	Data Carrier Detect
20	DTR	Data Terminal Ready

Micro^{3}C: Connecting RS232C Equipment through the Loader Port

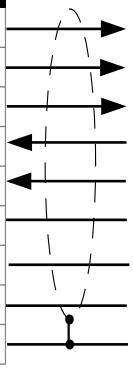
To connect equipment with an RS232C communication port to the loader port on the Micro^{3}C, use the user communication cable 1C (FC2A-KP1C). One end of the user end communication cable 1C is not provided with a connector. It can be terminated with a proper connector to plug in to communicate with the RS232C port.

When the protocol selector switch is set to 1 or 3, the Micro^{3}C can communicate with RS232C equipment through the loader port using the user protocol. When the protocol selector switch is set to 0, 2, or 4, the Micro^{3}C can communicate through the loader port using the loader protocol.



Cable Connector Pinouts

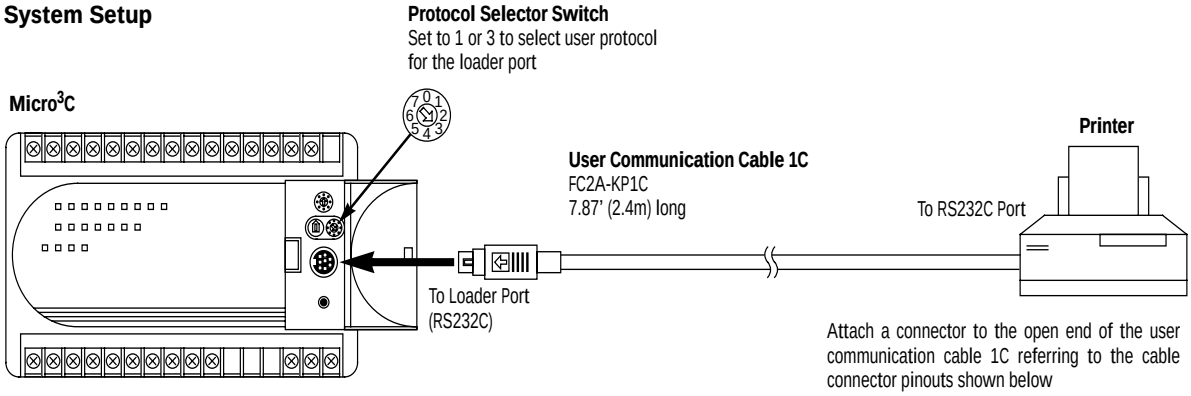
Pin	Description		AWG #		Color
1	RTS	Request to Send	28	Twisted	Black
2	DTR	Data Terminal Ready	28		Yellow
3	TDX	Transmit Data	28		Blue
4	RXD	Receive Data	28		Green
5	DSR	Data Set Ready	28		Brown
6	SG	Signal Ground	28		Gray
7	SG	Signal Ground	26	Twisted	Red
8	NC	No Connection	26		White
Cover	—	Shield	—		—



Micro^{3}C: User Communication TXD

The system setup demonstrates a program to send data to a printer using the user communication TXD (transmit) instruction. Serial printers used in this example are Seiko Electronic's DPU-201GS and Citizen's iDP3110 printers.

System Setup



Cable Connections for Seiko Electronic's DPU201GS

Mini DIN Connector Pinouts

Description		Color	Pin
Shield		—	Cover
NC	No Connection	Black	1
NC	No Connection	Yellow	2
TXD	Transmit Data	Blue	3
NC	No Connection	Green	4
DSR	Data Set Ready	Brown	5
SG	Signal Ground	Gray	6
SG	Signal Ground	Red	7
NC	No Connection	White	8

D-Sub 9-pin Connector Pinouts

Pin	Description	
1	NC	No Connection
2	NC	No Connection
3	DATA	Receive Data
4	NC	No Connection
5	GND	Ground
6	NC	No Connection
7	NC	No Connection
8	BUSY	Busy Signal
9	NC	No Connection

CPU Input/Output

Key features of the Micro^3 and Micro^{3}C input include:

- AC or DC inputs (Micro^3) or DC inputs (Micro^{3}C)
- Expandable from 10 to 48 I/O points
- Congure inputs: Sink or source for NPN or PNP devices
- Each unit selectable: CPU or expansion I/O
- LED indicators
- Optical isolation

		DC Input	AC Input (Micro^3 only)
Input Specifications	**Rated Input Voltage (allowable range)**	24V DC (19 to 30V DC)	100 to 120V AC (85 to 132V AC)
	Rated Input Current	7mA (input I/0: 13mA)	10mA/point
	Input Impedance	3.3kΩ (input I/0: 1.8kΩ)	13kΩ
	On/Off Current	On: 2.5mA (minimum) at 11V DC Off: 1.2mA (maximum)	On: 4mA (minimum) at 79V AC Off: 2mA (maximum)
	On/Off Voltage	On: 11V DC (minimum) Off: 5V DC (maximum)	On: 79V AC (minimum) Off: 20V AC (maximum)
	On/Off Time	Depends on input Iter setting (see note)	On: 20ms (maximum) Off: 20ms (maximum)

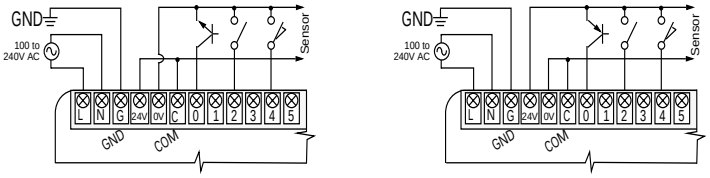
Relay Output Specifications	**Configuration**	**10 I/O (Micro^3 only)**	4 outputs: Independent NO = 1 point, Common NO = 3 points
		16 I/O	7 outputs: Independent NO = 1 point Common NO = 2 points + 4 points
		24 I/O	10 outputs: Independent NO = 2 points Common NO = 4 points + 4 points
		AC in (Micro^3 only)	7 outputs: Independent NO = 3 points Common NO = 4 points
	Switching Capacity		Independent contact: 240V AC or 30V DC, 2A (resistive load) Common contact: 240V AC or 30V DC, 2A × output points (resistive load)
	Minimum Applicable Load		5V DC, 1mA (reference value)
	Contact Resistance		30mΩ maximum (initial value)
	Life Ratings		Mechanical: 20,000,000 operations (no load) at 1,800 operations/hour Electrical: 100,000 operations (rated load) at 1,800 operations/hour

Each unit can be used as a CPU or expansion I/O using a selection switch. Sink/source inputs can be used with NPN- or PNP-output sensors. Input on and off times can be selected using the input lter function (FUN7 setting).

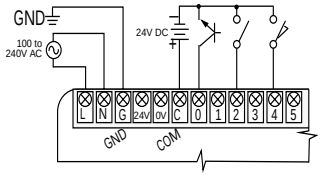
DC Input Circuit Diagrams

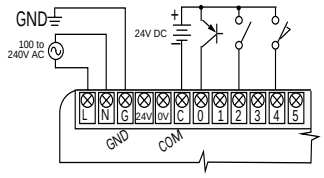
DC Inputs
(AC power)

Using Sensor P/S

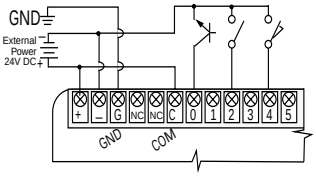


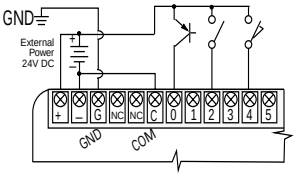
Using External P/S



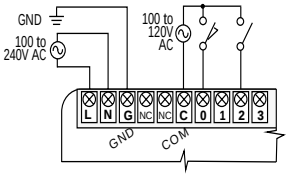


DC Inputs
(DC power)



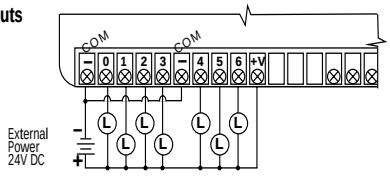


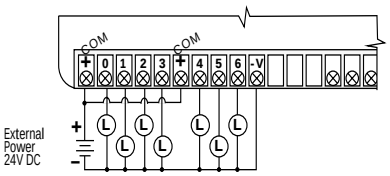
AC Inputs
(Micro^3 only)



Transistor and Relay Output Circuit Diagrams

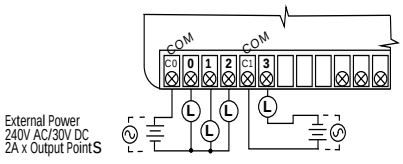
Transistor Outputs
(Micro^3 only)



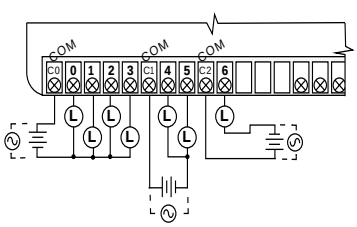


Relay Outputs

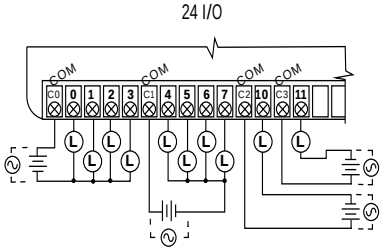
10 I/O



16 I/O



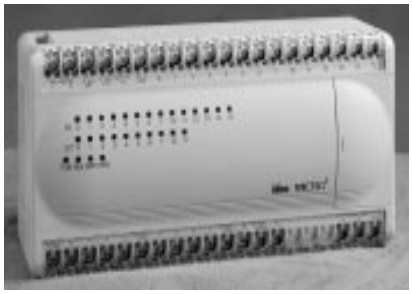
24 I/O



CPU: Transistor Output (Micro^3 only)

10 I/O

16 I/O



24 I/O

DC Input Specifications	**Rated Input Voltage (allowable range)**	24V DC (19 to 30V DC)
	Rated Input Current	7mA (input I0: 13mA)
	Input Impedance	3.3kΩ (input I0: 1.8kΩ)
	On/Off Current	On: 2.5mA (minimum) at 11V DC Off: 1.2mA (maximum)
	On/Off Voltage	On: 11V DC (minimum) Off: 5V DC (maximum)
	On/Off Time	Depends on input Iter setting (see note)

Transistor Output Specifications	**Configuration**	**10 I/O**	4 outputs: Common NO = 4 points
		16 I/O	7 outputs: Common NO = 3 points + 4 points
		24 I/O	10 outputs: Common NO = 5 points + 5 points
	Rated Load		0.5A, 24V DC — Maximum: 0.625A/circuit (30V DC)
	Inrush Current		5A, 1ms (maximum)
	Leakage Current		0.1mA (maximum)
	On Voltage		Sink: 1.5V DC (maximum)
	On/Off Time		On: 500µs (output Q0: 5µs), Off: 500µs (output Q0: 5µs)
	External Current Draw		24V DC, 100mA (maximum)

Each unit can be used as a CPU or expansion I/O using a selection switch. Sink/source inputs can be used with NPN- or PNP-output sensors. Input on and off times can be selected using the input lter function (FUN7 setting).

Analog Input/Output Units

Key features of the analog input and output units include:

- Micro supports one analog in and one analog out
- Input/output units accept a variety of signals
- Units connect to input Ø and/or output Ø

Analog output is only available for the Micro^3.

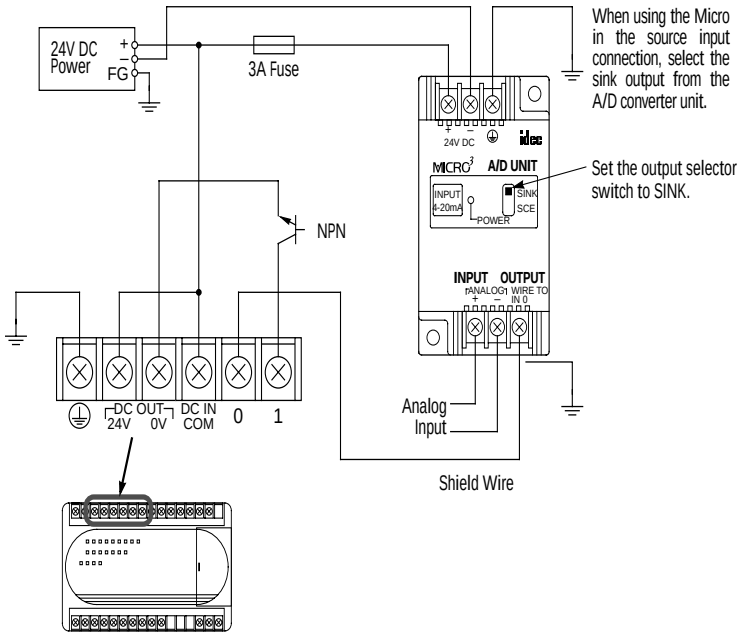
		AD Converter Unit	DA Converter Unit
Specifications	**Number of Inputs**	1 channel	1 channel
	Resolution	250 (see chart below)	245 (see chart below)
	Total Accuracy	±1% of the maximum value	±1% of the maximum value
	Conversion Time	125ms	0 to 95%: 500ms
	Maximum Applicable Input	16V DC	30V DC
	Maximum Applicable Output	30V DC	Voltage output: 12V DC Current output: 12V DC or –0.6V DC
	Output Short Circuit	Not allowed	Allowed (innite period of time)
	Recommended Output Load Impedance	—	Voltage output: 5kΩ or more Current output: 250Ω or less (300Ω maximum)
	Input Frequency	—	312.5Hz (PWM mode must be set to MODE3)
	Output Ripple	—	1 LSB or less

The A/D converter unit is used with the Micros to perform an 8-bit A/D conversion. The A/D converter unit reads an analog input signal from an analog output device such as an analog distance sensor. The output from the A/D converter unit is entered to the Micro input I0 and converted into a digital value (0 through 249) using the A/D (analog/digital conversion) instruction.

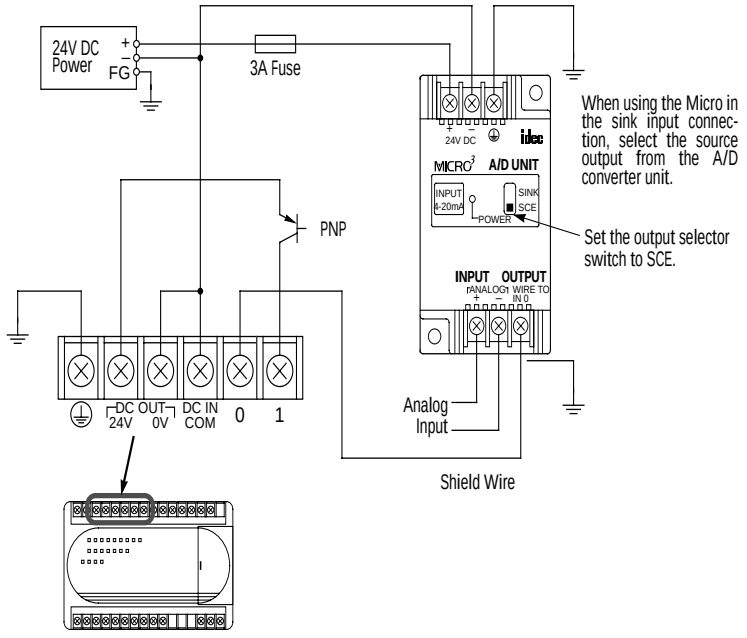
If the input to the A/D converter unit exceeds the input range, then an overow occurs, and 250 is set to the destination operand of the A/D instruction. Only one A/D converter unit can be connected to the Micro base unit.

When the A/D converter unit is connected to the Micro, the HSC (high-speed counter) function cannot be used.

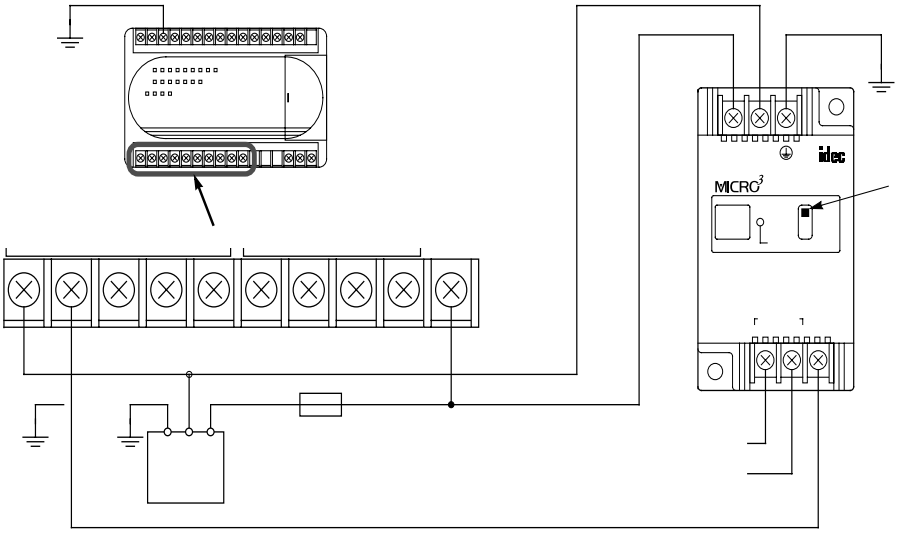
Source Input

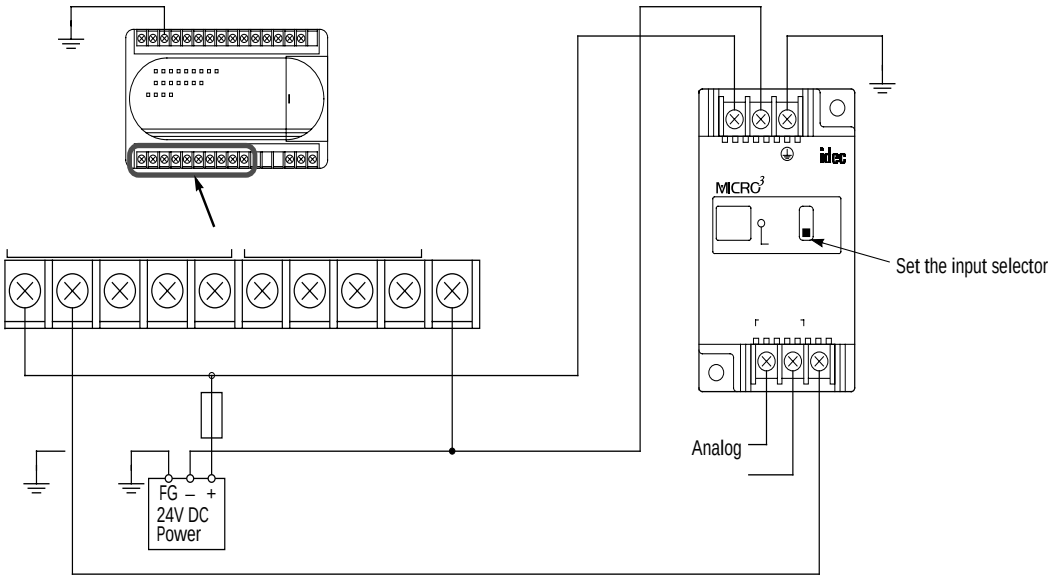


Sink Input



The D/A converter unit is used with the transistor output type Micro^3 base unit to perform an 8-bit D/A conversion. The pulse width modulation instruction is used to convert the digital value to a pulse output signal. The output from the Micro^3 output Q0 is entered to the D/A converter unit to generate an analog current or voltage output to control an inverter. Only one D/A converter unit can be connected to the Micro^3 base unit.





Basic Instructions

Steps	Instruction	Description
1	AND	And
1	AND LOD	And load
1	ANDN	And not
1	BPP	Bit pop
1	BPS	Bit push
1	BRD	Bit read
2	CNT	Counter
2	CC=	Counter compare =
2	CC≥	Counter compare ≥
1	END	End
1	JEND	Jump end
1	JMP	Jump
1	LOD	Load
1	LODN	Load not
1	MCS	Master control set
1	MCR	Master control reset
—	NOT	Not
1	OR	Or
1	OR LOD	Or load
1	ORN	Or not
1	OUT	Output
1	OUTN	Output not
1	RST	Reset
1	SET	Set
2	SFR	Shift register
2	SFRN	Shift register not
1	SOTD	Single output falling
1	SOTU	Single output rising
2	TIM	100ms timer
2	TM	10ms timer
2	TMS	1ms timer

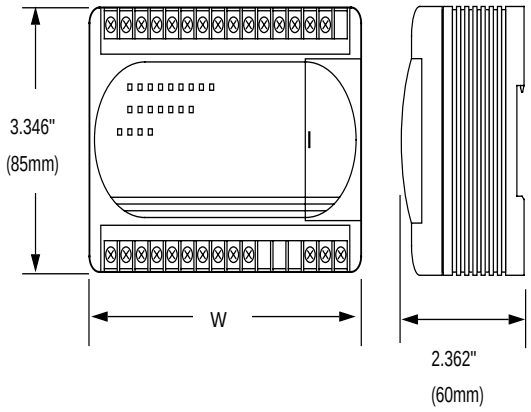
Advanced Instructions

Steps	Instruction		Description
1	0	NOP	No operation
3 – 4	11	MOV	Word move
3 – 4	12	MOVN	Word move not
5 – 6	13	IMOV	Word indirect move
5 – 6	14	IMOVN	Word indirect move not
4 – 5	21	CMP=	Equal compare
4 – 5	22	CMP<>	Not equal compare
4 – 5	23	CMP<	Less than compare
4 – 5	24	CMP>	Greater than compare
4 – 5	25	CMP<=	Less than or equal compare
4 – 5	26	CMP>=	Greater than or equal compare
4 – 5	31	ADD	Addition
4 – 5	32	SUB	Subtraction
4 – 5	33	MUL	Multiplication
4 – 5	34	DIV	Division
4 – 5	41	ANDW	And word
4 – 5	42	ORW	Or word
4 – 5	43	XORW	Exclusive or word
3	51	SFTL	Shift left
3	52	SFTR	Shift right
3	53	ROTL	Rotate left
3	54	ROTR	Rotate right
2	71	CALR	Calendar read*
2	72	CALW	Calendar write*
2	73	CLKR	Clock read*
2	74	CLKW	Clock write*
1	75	ADJ	Adjust*
4	81	DISP	Display
4	82	DGRD	Digital switch read
2	83	ANR0	Analog potentiometer 0 read
2	84	ANR1	Analog potentiometer 1 read*
3	91	PULS	Pulse output
3	92	PWM	Pulse width modulation
2	93	A/D	Convert analog to digital
4	A1	HSC0	H/S counter 0 (32 bits)
2	A2	HSC1	H/S counter 1 (32 bits)
4	A3	HSC2	H/S counter 2 (32 bits)
2	A4	HSC3	H/S counter 3 (16 bits)
5 – 404	B1	TXD	Transmit (Micro^{3}C only)
5 – 404	B2	RXD	Receive (Micro^{3}C only)
4 – 5	B3	COMP^2	Double word compare (Micro^{3}C only)

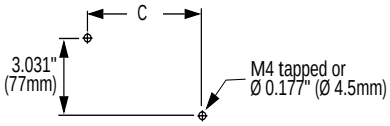
*Instruction designated by * are not affected by the change to the year 2000.*

Dimensions

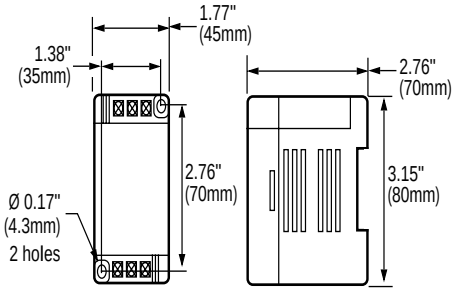
Micro^3 and Micro^{3}C Base Units



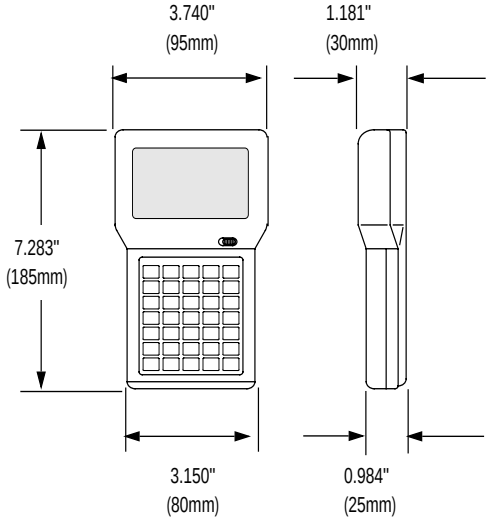
Mounting Hole Layout



A/D and D/A Analog Converters



Program Loader

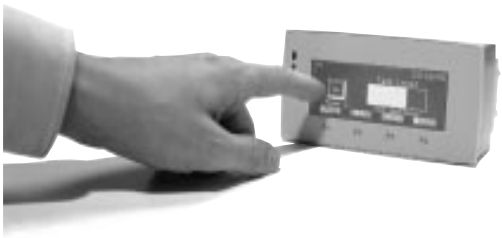


Key to Dimensions

	W	C
10 I/O	4.134" (105mm)	3.386" (86mm)
16 I/O	5.315" (135mm)	4.567" (116mm)
24 I/O*	6.496" (165mm)	5.748" (146mm)*

**Dimensions are the same for the 16 I/O AC input unit.*

Revolutionary Operator Interface



Key features of the MicrO/I operator interface include:

- User-congurable, forty-eight-point touch LCD screen
- Dual-color backlights for easy-to-read alarms
- Windows-based conguration software
- 64k of memory for conguring up to 100 screens
- Four denable function keys on front panel
- Dynamic text messaging
- Library of bitmap images and graphics
- Real-time clock and calendar
- Six dedicated I/O points — four inputs, two outputs
- Meets IP65 standards
- Space saving design — approximately 5.5" x 3" x 3.5"

General Specifications			
	Electrical	Rated voltage	24V DC ripple factor: 10% maximum
		Voltage variation range	85 to 115% of rated voltage
		Power consumption	10W maximum
		Instantaneous stopping time	10ms maximum
		Inrush current	10A maximum
		Dielectric strength	1500V AC, 10 ms, 1 hour (between power or I/O terminal and ground)
		Insulation resistance	In 500V DC megger at least 50MΩ (between power or I/O terminal and ground)
	Environmental	Operating temperature range	0 to 55˚C (operation) 0 to 50˚C (display contrast)
		Operating humidity range	20 to 85% (avoid condensation)
		Storage temperature	– 20 to +70˚C
		Storage humidity	20 to 85% (avoid condensation)
		Vibration resistance	10 to 55Hz, 10 m/s^2 (2 hours each in the X, Y, and Z axes)
		Shock resistance	100 m/s^2 (5 times each in the X, Y, and Z axes)
		Noise resistance	Between power terminal and ground: 1k V p-p, 1µs, 1ns (with noise simulator)
		Static electricity resistance	5kV (using a static electricity simulator)
		Operating atmosphere	No corrosive gases
	Structural	Installation	Panel mount
		Protection rating	IP65
		Exterior dimensions (W x H x D)	5.7" x 2.9" x 3.3" (146 x 75 x 85.5mm)
		Weight	500g approximate

Operating Specifications			
	On-Screen Switches	Operating method	Resistive touch overlay
		Touch points	12 x 4 = 48
		Operating pressure	100g or less
		Life	1,000,000 operations minimum
	Function Switches	Operating method	Pressure sensitive switch
		Number of switches	Four (F1 to F4)
		Operating pressure	100 to 500g
		Life	1,000,000 operations minimum

Part Numbers: MicrO/I™

Item	Part No.	Description
MicrO/I	HG1A-SB32BF	RS-232C host interface, RS232C maintenance
	HG1A-SB32CF	RS-485 host interface, RS232C maintenance
Maintenance Cable	HG9Z-XCM1A	Link cable for RS232C maintenance port to PC
Host Cable	HG9Z-XC11A	Link cable for RS232C host port to RS232C port of PLCs
	HG9Z-XC12A	Link cable for RS232C host port to IDEC FA series PLCs
	HG9Z-XC13A	Link cable for RS485 host port to IDEC Micro^3 series PLCs
	HG9Z-XC21A	Link cable for RS232C host port to IDEC Micro-1 series PLCs
	HG-97-XC183	Link cable for RS232C host port to IDEC Micro^{3}C series PLCs
	Standard shielded wires	Link cable for RS485 host port to IDEC Micro^{3}C data link port
Replacement Backlight	HG9Z-1B	New light for display
WindO/I™	HG9Z-WINDOI	Conguration software
Non-IDEC Drivers	HG9Z-WINDOI-D	Communication drivers for non-IDEC PLCs

Display Specifications	**Device**	Display elements	STN binary mode crystals (transparent type)
		Backlight	Red, blue, or white (red + blue)
		Effective display	3.7" x 1.2" (95 x 31mm)
		Number of pixels	192 x 64
		Pitch	0.5 x 0.5mm
		Pixel size	0.47 x 0.47mm
		Element life	At least 50,000 hours
		Backlight life	At least 10,000 hours
	Display Characters	Character size	Six levels of height and width magnication (= 36 different sizes)
		Lines	Up to six lines with 32 characters per line
		Graphics	Displays any bitmap image; Library of bitmaps included with conguration software

Display Software Specifications	**Display Pages**	Up to 100 text/graphic pages
	Analog Point Definitions	Display raw or scaled analog values
	Digital Point Definitions	Two- or four-state digital points
	Alarm Management	Monitors analog or digital points
	Numeric Data Entry	Pop-up numeric keypad
	Touch Points	Up to 48 touch points per page
	Touch Functions	Toggle digital points on/off, ramp values up/down, change presets, change pages, and acknowledge alarms
	Operator Feedback	Visual/audible feedback of touch input
	Function Keys	User-congurable
	Text	User-denable as static or dynamic
	Backlight	User-denable; backlight color can be changed or ashed based on alarm condition
	PLC Support	Communication drivers support most PLCs

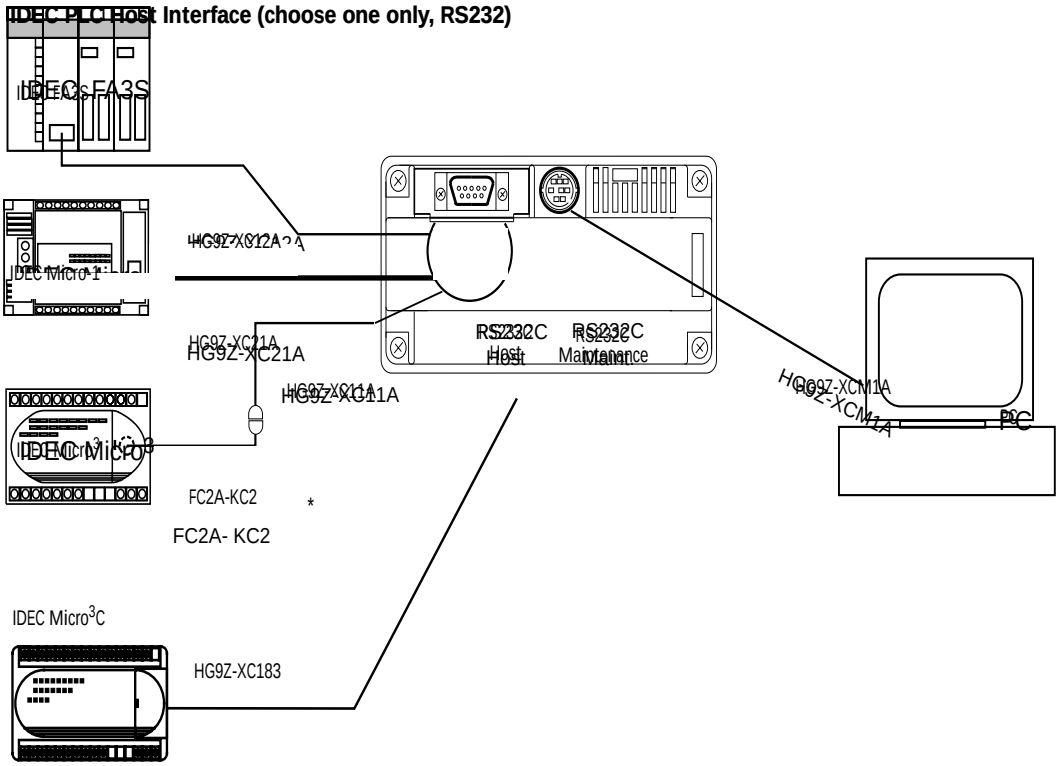
Critical Alarms for Critical Conditions

In an alarm situation, it is absolutely necessary for machine operators to be aware of machine status. Despite the MicrO/I's compact size, operators can see screen alerts from across the plant oor .

For example, a critical alarm indicator may be congured to ash red at a rapid rate. Less critical alarms may be congured to ash at a slower rate or simply to change colors.

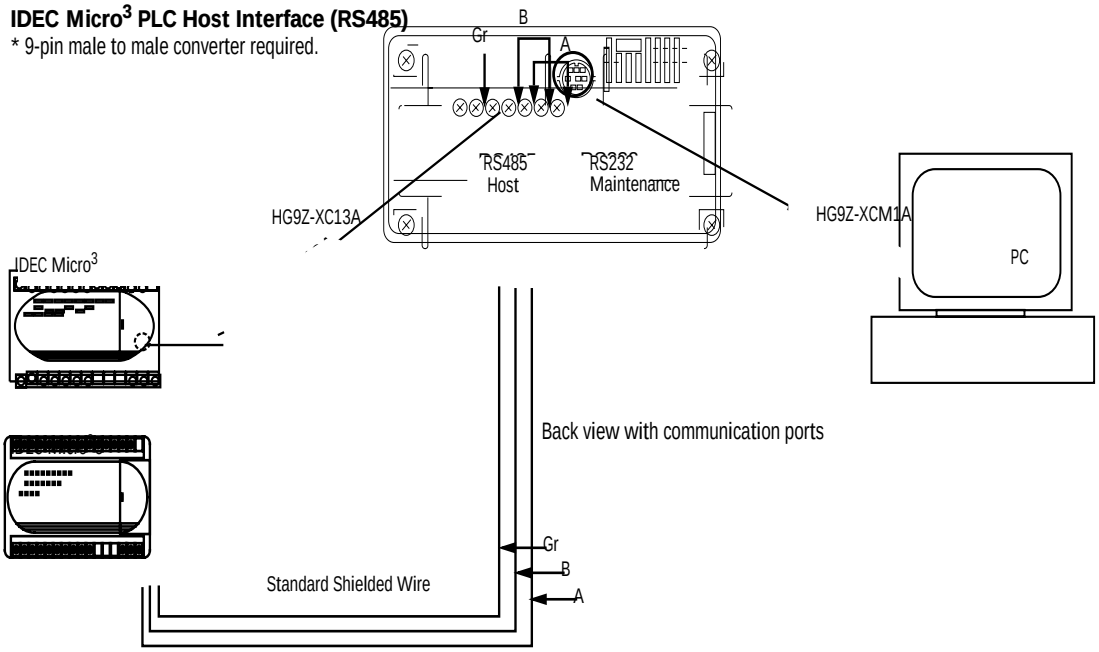
Three display colors are available with the MicrO/I: red, blue, and extra bright white (combination of red and blue). Each may be selected to reect a different alarm priority . To help maintain alarm records, the MicrO/I prints hard copies as well.

IDEC PLC Host Interface (choose one only, RS232)

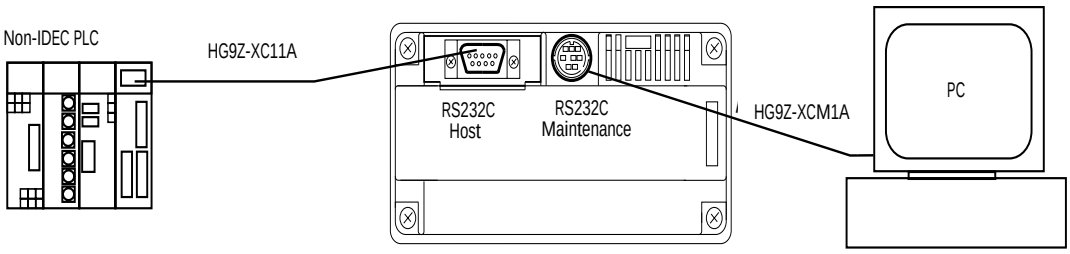


IDEC Micro^3 PLC Host Interface (RS485)

* 9-pin male to male converter required.

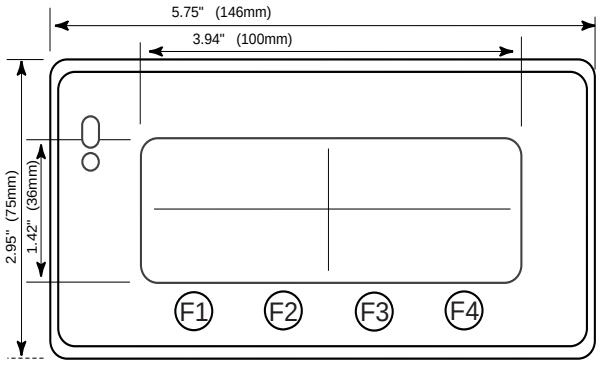


Non-IDEC PLC Host Interface (RS232)

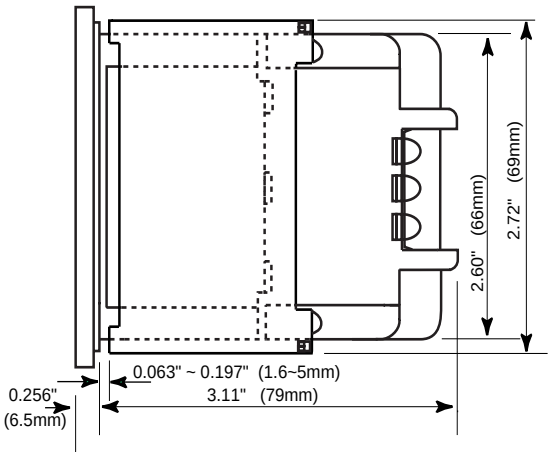


Dimensions

MicrO/I Front View



MicrO/I Side View



MicrO/I Bottom View