Multi-Point Digital Gas Detection and Control System

DESCRIPTION

Wall mounted, microprocessor-based, multi-point, RS-485 digital communicating system for various gas, temperature and humidity detection, control and alarm.

APPLICATION

To control and alarm upon the presence of any toxic, combustible and refrigerant gases. A combination of the RS-485 communicating DT5 series and analog AT series, or other 4-20 mA transmitters piggy-backed via a digital DT5 transmitter, can be connected to the control unit. The controller interfaces via binary outputs, 4-20 mA signals, and an optional BACnet, LON or Modbus coupler with any compatible electronic control, DDC/PLC control or automation system.

FEATURES

- *Continuous monitoring*
- *RS-485 digital bus, serial communication*
- *Up to (98) remote RS-485 digital communicating transmitter inputs; or combination of (48) RS-485 digital & (48) 4-20 mA analog transmitters*
- *Four (4) digital inputs*
- *Up to (5) built-in or remote RS-485 relay/AO modules:*
  - *Up to (30) relay outputs, five-stage control, fail-safe assignable*
  - *Up to (12) 4-20 mA outputs, selectable for low, high or averaging*
- *One (1) 24 VDC supply output*
- *Built-in horn*
- *Accepts combination of toxic or combustible gases, refrigerants, temperature or humidity sensor inputs*
- *Optional BACnet, LON or Modbus coupler upwards communication to BAS*
- *Liquid Crystal Display (LCD)*
- *LED status indicators*
- *Keypad user interface*
- *Simple menu-driven programming*
- *Modular technology*
- *Overload & short-circuit protected*
- *Resettable breaker*
- *NEMA 4X enclosure*
- *Easy maintenance*

PolyGard DGC5

"Enclosure Type B"

City of Los Angeles Approved

NRTL Tested & Certified
Conforms to STD
UL 2017

System performance tested in conjunction with PolyGard Carbon Monoxide & Combustible Gas Transmitters to STD **UL 2075**

Upwards Communication Options
BACnet, LON, Modbus

SPECIFICATIONS

Electric

Power supply	120 VAC (90...230 VAC), 50/60 Hz resettable breaker, 24 VAC on request
Power consumption	70 VA, max.
RF/EMI protected	4.0 W @ 3 ft. (1 m) radiated

Type of Control

General	Five-stage (S1 to S5) control, assignable up to thirty (30) binary/relay outputs, i.e. Low-med-high-fault/fail-horn*, or low1-low2-med1-med2-high, or any other combinations (* = horn/audible alarm built-in and factory pre-configured to relay output "R05")

Digital inputs/outputs, serial communications

- standard	(1) RS-485 parallel port
- optional, add-ons	Up to (8) RS-485 parallel ports, proprietary protocol, single 4-conductor multi-drop configuration link
- protection	Current limitation and over voltage
- device configuration	(98) remote RS-485 digital DT5 transmitters; or (48) remote RS-485 digital DT5 transmitters with (48) remote 4-20 mA analog AT transmitters, and up to (5) RS-485 relay/AO modules (total of 30 relays and 12 analog outputs per system)

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SPECIFICATIONS (cont...)

Type of Control (cont…)	
Stage level / setpoint	Field adjustable over full range, five (5) per transmitter input, assignable to current or mean (average) value
- hysteresis/ switching differential	Selectable for each sensor point
Digital inputs	Four (4), each can be individually assigned to any relay;
- application	Remote audio/visual alarm reset or override function
Relay outputs w/status LEDs	
- standard	Five (5) SPDT, 8 A, 24 VAC/VDC - 250 VAC, contact resistance 100 mΩ, max.
- optional, add-ons	Up to (10) SPDT, built-in "Max. possible (5) modules (30 relays) remotely or built-in"
- each stage level (S1-S5)	Assignable to any relay
- sensor fail-safe	Assignable to any stage level
Time delay switching	Selectable for make and brake of each sensor point (SP) 0-9,999 seconds
VDC output supply	24 VDC, 0.5 A fused
Analog output	Two (2) independent 4-20 mA signals, 500 Ω max. load, selectable as low, high or averaging of sensor inputs, per relay/AO module
Audible alarm	85 db (10 ft), enabled or disabled, selectable; assignable to stage level S1, S2, S3, S4 or S5
Alarm acknowledgement	Menu-driven and system reset function for latched relays
User Interface	
Keypad type	Refer to "illustration keypad user interface"
Touch buttons	Six (6)
Status LED's	Red: Alarm Yellow: Fault (fail)
Digital display	Liquid Crystal Display (LCD), two lines, 16 characters per line, 1 digit resolution, backlit
- unit display	Menu selectable, per sensor; ppm, %v/v, %LEL, °F or % RH
BACnet Interface, optional*	Read status information via BACnet coupler and BACnet-Profile, BACnet-Services and BACnet BIBBs
Coupler module	C5-BAC-98 (B1) or C5-BAC-48-48 (B2)
Communication	TCP/IP 10/100 Mbits/sec
Sensor values	All 0-250 ppm CO or 0-100%
Connector	Ethernet RJ45
Interface	BACnet-Profile
Description	BACnet-Services "Who-is (execute)" "I-am (initiate)" "ReadProperty" "WriteProperty"
Object types	Version B1.2, B2.2
LON Interface, optional*	Read status information via LON coupler(s) and LON interoperable nodes to a LON network
Coupler module(s)	DA, DB, NLA, NLB
LONWORKS®	Standard network variables, SNVTs according LONWORKS® application layer, interoperability directives
- device category	Gas concentration
- communication	TP/FT-10
- LONWORKS® version	3.2
- LONWORKS® object	0000 - node object 0001 - open loop sensor object 0054 - open loop sensor object
- standard program ID	49:4F:50:2D:44:00:00:00
- standard networks & configuration variables	Refer to "ordering information section, and user manual"
Modbus Interface, optional*	Read status Information via Modbus coupler and Modbus function 16 and 03
Coupler module	C5-MOD (M0)
Communication	19200 baud 1 start-bit, 8 data-bits 1 stop-bit, no parity
Interface	Function 16
Description	Function 03
Addresses	
- 1000 to 1098	Current value internal, sensor 1-98
- 2000 to 2048	Current value external, sensor 1-98
- 3000 to 3098	Average value internal, sensor 1-98
- 0 to 6	Relay bits, relay 1 to 30
- 8 to 19	Analog outputs 1 to 12
Environmental	
Permissible ambient	
- working temperature	23 °F to 104 °F (-5 °C to 40 °C)
- storage temperature	-4 °F to 104 °F (-20 °C to 40 °C)
- humidity	15 to 95% RH, non-condensing
- working pressure	Atmospheric ± 10%

(*) BACnet, LON and Modbus Interface: NRTL Certification to UL STD 61010-1 – "Pending"

SPECIFICATIONS (cont...)

Physical

Enclosure (panel)	
- material	Polycarbonate, impact resistance EN 50102/IK08, flammability rating UL 94-5V
- conformity	UL Type 1, UL508/UL 50 standards
- color	Light gray, smoked gray for cover
- protection	NEMA 4X (IP65)
- installation	Wall (surface) mounted
Enclosure type “A” (DGC5-Encl-A)	
Dimensions (H x W x D)	
- base, standard size	11.0 x 12.0 x 5.7 in. (280 x 306 x 145 mm)
Cable entry	10 holes for 1/2 in. conduit, covered
Enclosure type “B” (DGC5-Encl-B)	
Dimensions (H x W x D)	
- base, standard size	16.9 x 12.0 x 5.7 in. (430 x 306 x 145 mm)
Cable entry	10 holes for 1/2 in. conduit, covered
Enclosure type “C” (DGC5-Encl-C)	
Dimensions (H x W x D)	
- base, standard size	22.8 x 12.0 x 5.7 in. (580 x 306 x 145 mm)
Cable entry	10 holes for 1/2 in. conduit, covered
Wire Connection	Terminal blocks, Push-on connect and screw type for lead wire
Wire size	
- power supply input	Min. 16 AWG (1.5 mm^2) Max. 14 AWG (2.5 mm^2)
- inputs/outputs	Min. 20 AWG (0.5 mm^2) Max. 16 AWG (1.5 mm^2)
Weight	
- w/enclosure type “A”	7.7 lbs. (3.5 kg)
- w/enclosure type “B”	10.4 lbs. (4.7 kg)
- w/enclosure type “C”	13.9 lbs. (6.2 kg)

Approvals / Listings

- unit rating	NRTL Performance Tested & Certified Conforms to STD ANSI/UL 2017 City of Los Angeles CE VDI 2053, C-No. 418791 EMV-Compliance 89/336/EWG
- enclosure (panel)	UL Listed, E75645
Warranty	Two years material and workmanship

ORDERING INFORMATION

DGC5 - A 0 2 - 1 0 00 US

C5 Upwards Communication Gateways	
00	None
B1	BACnet; for 98 DT5 Transmitters; 0–250 ppm CO (C5-BAC-98)
B2	BACnet; for 48 DT5-AT/LC Transmitters; 0–250 ppm CO (C5-BAC-48-48)
B3	BACnet; for 98 DT5 Transmitters; 0–100% (C5-BAC-98-1)
B4	BACnet; for 48 DT5-AT/LC Transmitters; 0–100% (C5-BAC-48-48-1)
L1	LON; for 56 DT5 Transmitters (C5-LON-DA)
L2	LON; for 98 DT5 Transmitters (2x = C5-LON-DA+DB)
L3	LON; for 28 DT5-AT Transmitters (C5-LON-NLA)
L4	LON; for 48 DT5-AT Transmitters (2x = C5-LON-NLA+NLB)
M0	Modbus; for DT5 or DT5-AT Transmitters (C5-MOD)

EP5-05 Relay/AO Expansion Modules	
0	None
1	(5) Relays / (2) 4-20 mA (1x EP5-05)
2	(10) Relays / (4) 4-20 mA (2x EP5-05)

RS-485 Serial Port/Trunk Connections	
1	1 Port/Trunk Module (1x CON5-A)
2	2 Port/Trunk Modules (2x CON5-A)
3	3 Port/Trunk Modules (3x CON5-A)
4	4 Port/Trunk Modules (4x CON5-A)
5	5 Port/Trunk Modules (5x CON5-A)
6	6 Port/Trunk Modules (6x CON5-A)
7	7 Port/Trunk Modules (7x CON5-A)
8	8 Port/Trunk Modules (8x CON5-A)

RS-485 GC5 Controller	
1	98 DT Transmitters (GC5-98)
2	48 DT-AT Transmitters (GC5-48-48)

Enclosure Options	
0	None
1	Keylock with 2 Keys (ENCL-A)
2	Keylock with 2 Keys (ENCL-B)
3	Keylock with 2 Keys (ENCL-C)

Enclosure Type		
A	1 DIN Rail / 1 Window (DGC5-Encl-A)	“Small”
B	2 DIN Rails / 2 Windows (DGC5-Encl-B)	“Medium”
C	3 DIN Rails / 3 Windows (DGC5-Encl-C)	“Large”

Maximum Controller Options		
	Large Modules*	Small Modules**
Encl. “A”	0	4
Encl. “B”	0	10
	1	8
	2	4
Encl. “C”	2	10
	3	7
	4	4

* EP5-05, L1 & L3 = 1. L2 & L4 = 2

** CON5-A, B1, B2, B3, B4, M0

Basic central control unit, **ordering part number**:
DGC5 - A02 - 1000 US
Configuration includes:

Small-sized panel enclosure, (1) DIN rail & (1) window door, NEMA 4X, power supply 90...250 VAC, digital programmable RS-485 GC5-48-48 controller for combo DT5 + AT transmitter inputs, with menu-driven keypad user interface, LCD & LEDs,
(1) RS-485 CON5-A serial port/trunk connector

Inputs:
- Via RS-485 serial port(s); up to (48) remote DT5 digital communicating transmitters, each can be paired with one remote AT analog 4-20 mA transmitter
- (4) Digital inputs

Outputs:
- (5) Relays, SPDT, 8 A relay
- (2) 4-20 mA
- (1) 24 VDC, 0.5 A
- (1) Built-in horn

Note: The DGC5 system, via RS-485 serial port(s), can be expanded to handle a maximum of (25) relays and (10) 4-20 mA outputs with optional remote relay/AO units:

REL5-5R-2A = (5) relays & (2) 4-20 mA outputs
REL5-2R-1A = (2) relays & (1) 4-20 mA outputs

Enclosure Types “A”, “B” and “C”

Expansion Configuration for DGC5-A, Enclosure **“A”**:
* Up to max (4) CON5-A RS-485 Serial Port/Trunk Connector Modules

Expansion Configuration for DGC5-B, Enclosure **“B”**:
* Up to max (4), possibly (8) CON5-A RS-485 Serial Port/Trunk Connector Modules
* (1), possibly (2) EP5-05 Realy/AO Expansion Modules
* (1), possibly (2) C5-... BACnet, LON, or Modbus Couplers

Example of max space available for controller, modules and couplers:
(1) GC5-98 + (5) CON5-A + (1) EP5-05 + (1) C5-...

Expansion Configuration for DGC5-C, Enclosure **“C”**:
* Up to max (4), possibly (8) CON5-A RS-485 Serial Port/Trunk Connector Modules
* (2), possibly (4) EP5-05 Realy/AO Expansion Modules
* (1), possibly (2) C5-... BACnet, LON, or Modbus Couplers

Example of max space available for controller, modules and couplers:
(1) GC5-98 + (4) CON5-A + (2) EP5-05 + (2) C5-...

“Enclosure Type A”

“Enclosure Type C”

LON Upwards Communication Couplers C5-LON-..

Compatible with GC5-98 Controller for DT5 transmitter inputs:

C5-LON-DA LON Coupler:
> (56) SNVTs for DT5 transmitters (01-56)
> (4) SNVTs for (20) digital relay status bits
> (2) SNVTs for (2) analog values with minimum/average/maximum function

C5-LON-DB LON Coupler:
> (42) SNVTs for DT5 transmitters (57-98)
> (6) SNVTs for (30) digital relay status bits
> (12) SNVTs for (12) analog values with minimum/average/maximum function

Compatible with GC5-48-48 Controller for Combo DT5 + AT transmitter inputs:

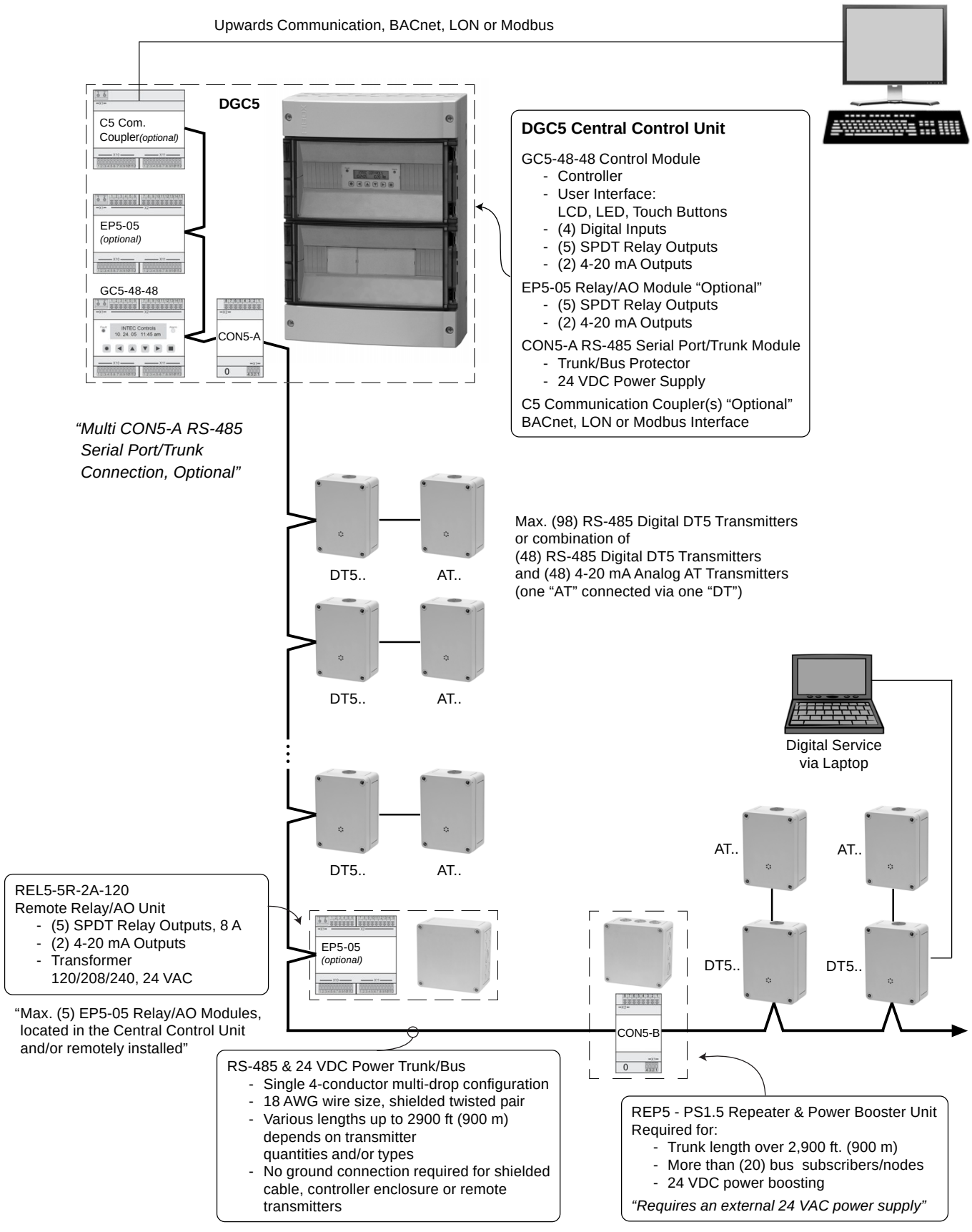
C5-LON-NLA LON Coupler:
> (28) SNVTs for DT5 transmitters (01.1-28.1)
> (28) SNVTs for AT transmitters (01.2-28.2)
> (4) SNVTs for (20) digital relay status bits
> (2) SNVTs for (2) analog values with minimum/average/maximum function

C5-LON-NLB LON Coupler:
> (20) SNVTs for DT5 transmitters (29.1-48.1)
> (20) SNVTs for AT transmitters (29.2-48.2)
> (6) SNVTs for (30) digital relay status bits
> (12) SNVTs for (12) analog values with minimum/average/maximum function

Note to ordering number “L2” and “L4” LON Coupler Combinations:

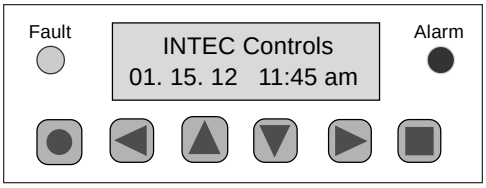
C5-LON-DA and C5-LON-DB combination (L2) with GC5-98 controller; and C5-LON-NLA and C5-LON-NLB combination (L4) with GC5-48-48 controller provides total added SNVTs for sensor/transmitters points; but provides only (6) SNVTs for six REL5-5R-2A relay/AO modules (total of 30 relays), and (12) SNVTs for twelve 4-20 mA output signals.

PolyGard DGC5 Multi-Point RS-485 Digital Gas Detection and Control System



USER INTERFACE & CONTROLLER

Keypad User Interface



Fault "Yellow LED" Flashes at system / sensor failed

Alarm "Red LED" Flashes when any stage level setpoint is exceeded; steady when any relay output is in manual override operation

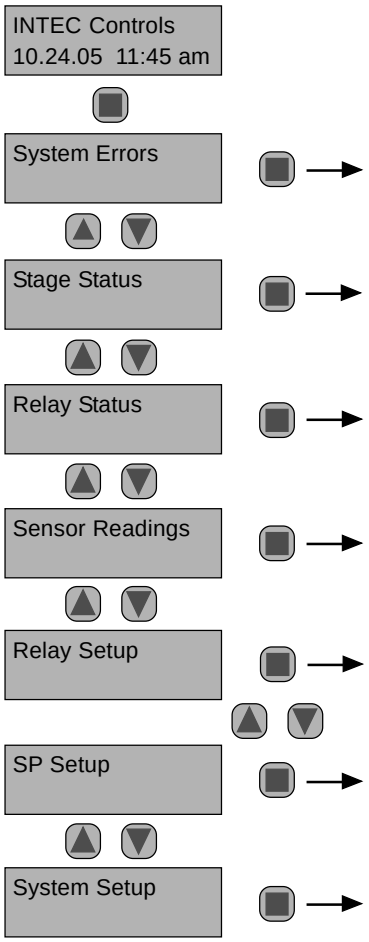
Scroll down & up in Main menu and Sub menus; increases or decreases a value

Navigates through menus on the same level; moves cursor when inputing data

Exits programming and saves settings or return to previous level or menu

Enter Sub menus or stores data; horn silence (if assigned)

Main Page & Main Menu



System Operation

All Programming is made via the keypad user interface in combination with the display screen. Security is provided via two password levels. The lower level password allows to override or to reset system status functions. The upper level password allows all programming and override functions.

Main Page Display

After powered on, displays IN*TEC* and part number and changes to sensor reading display unless a system error occurs; then the error is displayed.

Main Menu

Displays headings of "System Errors", "Stage Status" "Relay Status", "Sensor Readings", "Relay Setup", "SP (Sensor Point) Setup", and "System Setup".

Sub Menu "System Errors"

Displays errors, reset corrected errors, and historical error summary.

Sub Menu "Stage Status"

Displays status of each "SP" sensor point, stage level/ setpoint exceeded.

Sub Menu "Relay Status"

Displays status and manual control of each output relay.

Sub Menu "Sensor Readings"

The current and mean/average values are displayed for each "SP" sensor point with sensing type and engineering unit (ppm, %v/v, %LEL, F, %RH).

Sub Menu "Relay Setup"

Enter and /or change parameters of each relay.

- Assign de-energized or energized normal operation
- Select steady or flashing function
- Select horn function
- Select latching or non-latching mode
- Select digital input usage, and assign to any output relay

Sub Menu "SP Setup"

Enter and/or change parameters of each sensor point.

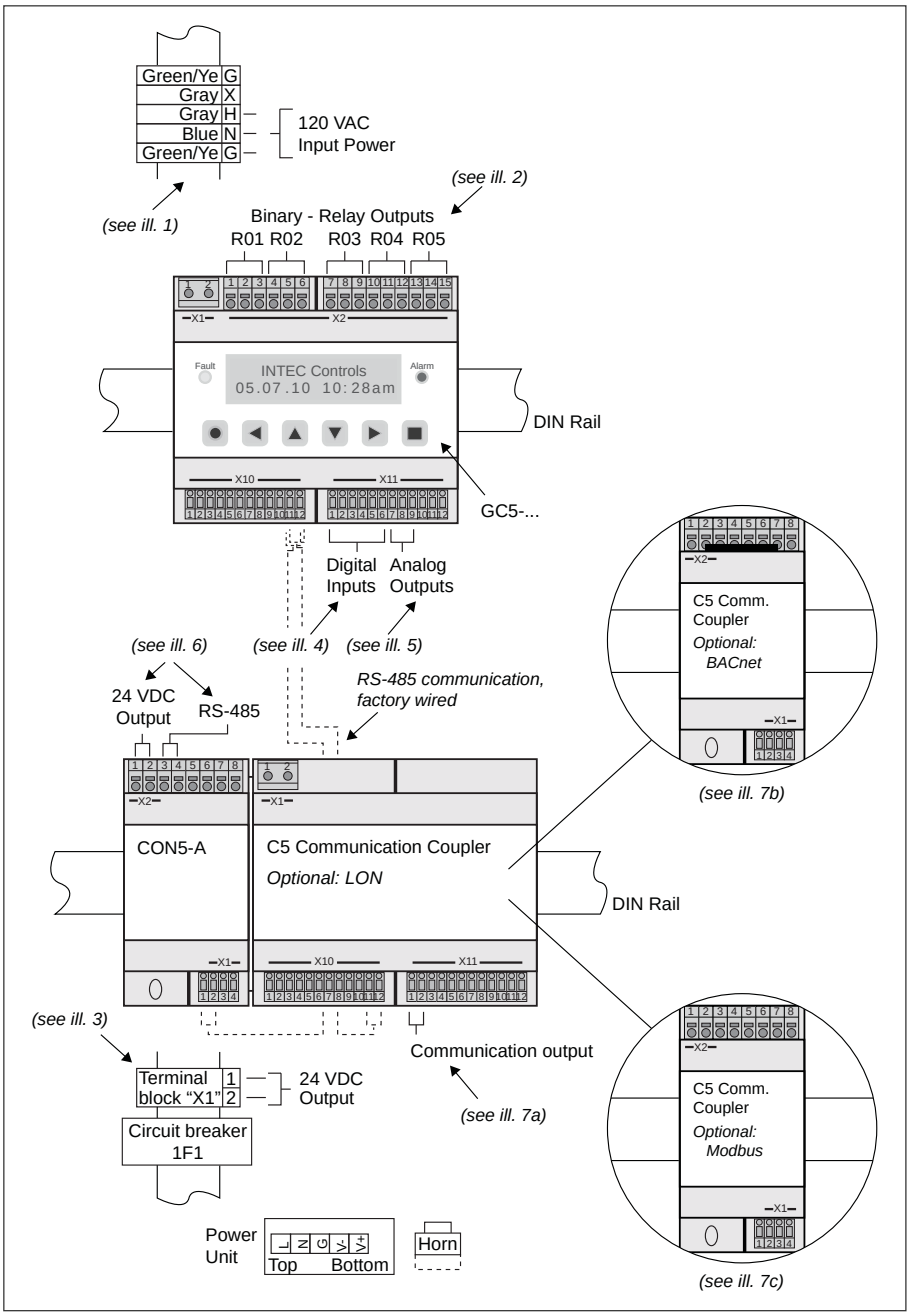
- Activate sensor point
- Select sensor point type (gas, temperature, humidity)
- Select measuring range
- Select sensor signal
- Select stage/setpoint 1 to 5
- Select hysteresis
- Set delay ON/OFF time
- Select current or mean/average value
- Assign sensor point fault to stage level setpoint
- Assign setpoint 1 to 5 to any output relay
- Assign to analog Output

Sub Menu "System Setup"

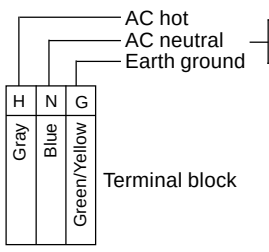
Enter and/or change system parameters.

- Select service mode
- Set next maintenance date
- Select service phone number
- Select averaging function, time and overlay, of any SP
- Set date, time and time format
- Change customer password
- Select analog output function
- Set failure relay
- Select power ON time
- Select apporpriate hardware configuration

FIELD WIRING CONFIGURATION



120 VAC Input Power Supply



- "Min wire size 16 AWG (1.5 mm²)"
- Resettable breaker, max 10A, rated current approx. 2A

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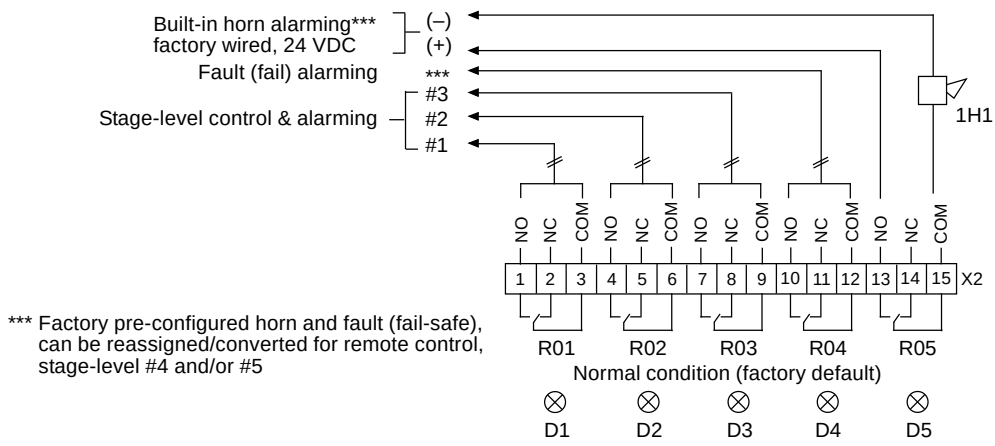
FIELD WIRING CONFIGURATION (cont...)

Binary - Relay Outputs “R01 to R05”



*** Factory pre-configured horn and fault (fail-safe), can be reassigned/converted for remote control, stage-level #4 and/or #5

⊗ = Relay status LEDs D1 to D5 located below terminal connection block X10

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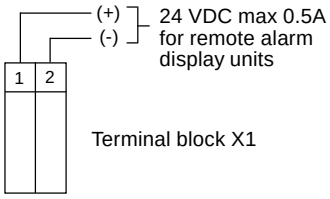
24 VDC Output Supply



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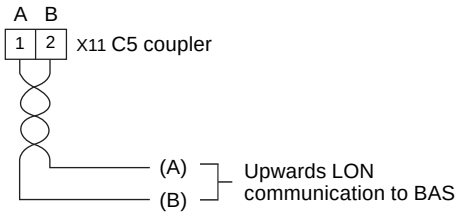
C5 Communication Coupler, LON



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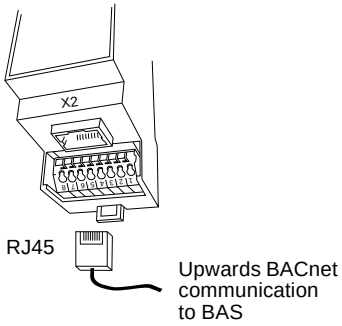
C5 Communication Coupler, BACnet



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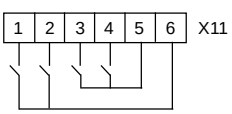
Digital Inputs “DI01 to DI04”



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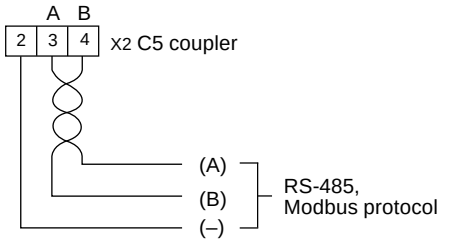
C5 Communication Coupler, Modbus



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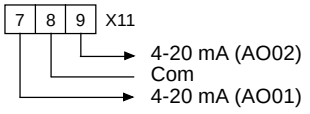
Analog Outputs “AO01 to AO02”



4-20 mA signal
to remote control or BAS,
selectable current or
averaging, 500 Ω max. load

The current signal is sourced
by the DGC5 system

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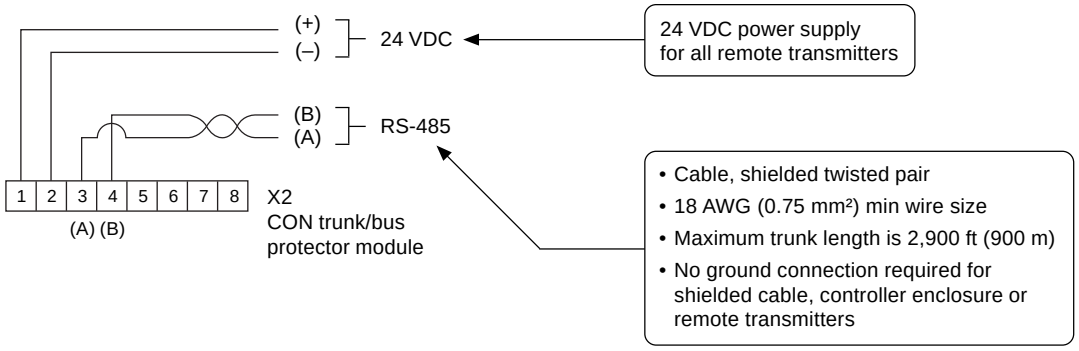
FIELD WIRING CONFIGURATION (cont...)

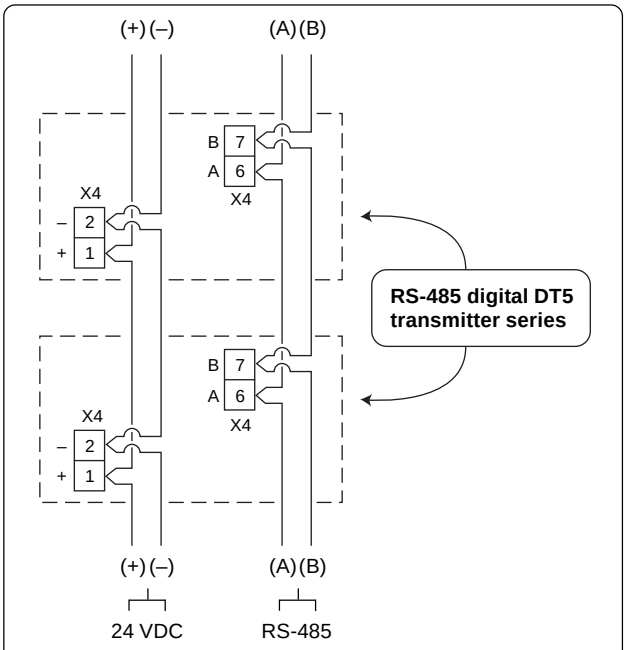
RS-485 Communication and
24 VDC Power Output Port Connections



A maximum of (98) remote RS-485 DT5 series transmitters, or a combination of (48) remote RS-485 DT5 and (48) remote 4-20 mA analog transmitters, connected one-to-one to the RS-485 DT5 transmitters, can be daisy-chained via the communication link (port).

Notes:

- *Do not connect power to **A** and **B**, this may damage the transmitters and possibly the trunk/bus protector CON module linked on the daisy-chain trunk.*
- *Daisy-chain between transmitters and CON module **A** to **A**, **B** to **B**. Do not cross **A** to **B**, this creates malfunction of communication.*
- *Do not use high voltage lines in the same RS-485 communication cable conduit.*



Daisy-chain (multi-drop) communication and powering between transmitters and controller's CON module

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