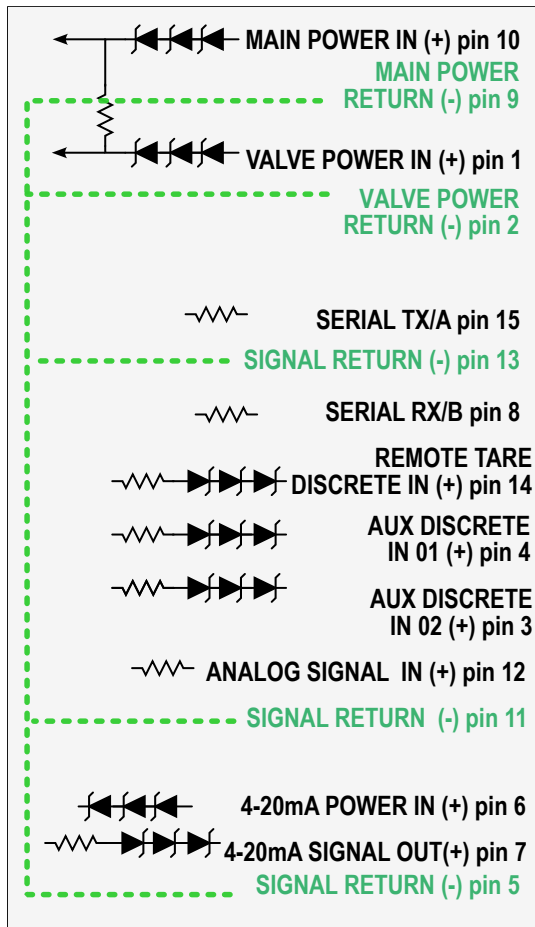


HAZARDOUS LOCATION
 Class I, Zone 0, Group IIC, T4
 Class I, Div. 1, Group A,B,C,D,T4
 Ta -20°C to +70°C

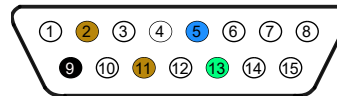
NON-HAZARDOUS LOCATION OR RATED LOCATION
 (Installer must observe barrier manufacturer's instructions,
 equipment markings and special conditions for all devices)

ALICAT IS-Max or IS-Pro



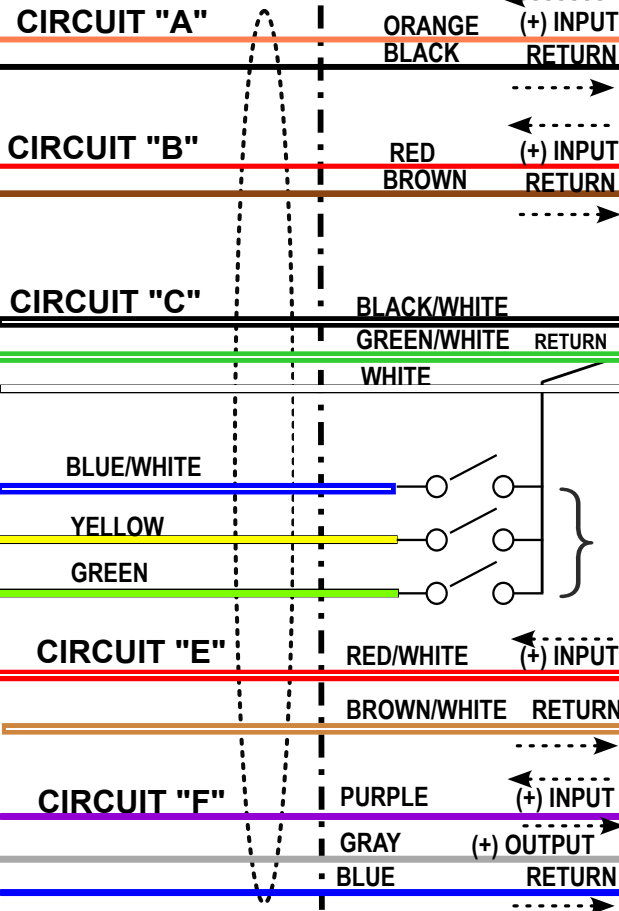
NOTE: ALL POWER AND SIGNAL RETURNS ARE CONNECTED TOGETHER INTERNAL TO DEVICE AND ISOLATED FROM CHASSIS.

ALICAT SUPPLIED
 PRE-FABRICATED
 MOULDED CABLE
 550pF/meter
 1.0µH/meter
 5.3µH/Ω max.



INSTRUMENT SIDE (MALE PINS) FACING CONNECTOR
 (returns 2, 5, 9, 11 & 13 shaded)

APPROVED BARRIERS



USE ENTITY PARAMETERS FROM CONTROL DRAWING TABLE 01 CIRCUIT "A" + CABLE PARAMETERS IN NOTE 4

USE ENTITY PARAMETERS FROM CONTROL DRAWING TABLE 01 CIRCUIT "B" + CABLE PARAMETERS IN NOTE 4 (NOT CONNECTED FOR METER ONLY APPLICATION)

USE ENTITY PARAMETERS FROM CONTROL DRAWING TABLE 01 CIRCUIT "C" + CABLE PARAMETERS IN NOTE 4 (RETURN NOT USED FOR ISOLATED RS485)

USE ENTITY PARAMETERS FROM CONTROL DRAWING TABLE 01 CIRCUIT "D" + CABLE PARAMETERS IN NOTE 4

USE ENTITY PARAMETERS FROM CONTROL DRAWING TABLE 01 CIRCUIT "E" + CABLE PARAMETERS NOTE 4

USE ENTITY PARAMETERS FROM CONTROL DRAWING TABLE 01 CIRCUIT "F" + CABLE PARAMETERS NOTE 4

FIGURE 01 CONNECTION TO APPROVED BARRIERS

SIGNAL NAME	SIGNAL FUNCTION	CIRCUIT ON CONTROL DIAGRAM	IS-Max or IS-Pro CONNECTOR PIN	SIGNAL RETURN	U _i /V _{max}	P _i	I _i	C _i	L _i	U _o /V _{oc}	P _o	I _o /I _{sc}	C _o	L _o
MAIN POWER IN	MAIN MODULE POWER INPUT	A	10	9	12.1V	INTERNALLY LIMITED	3.33A	0	0	N/A - BLOCKED WITH INFALLIBLE SERIES DIODES -★				
					13V		2.02A							
					14V		1.2A							
					15V		0.9A							
					15-28V		1.25W							
VALVE POWER IN	VALVE MODULE POWER INPUT	B	1	2	12.1V	INTERNALLY LIMITED	3.33A	0	0	N/A - BLOCKED WITH INFALLIBLE SERIES DIODES -★				
					13V		2.02A							
					14V		1.2A							
					15V		0.9A							
					15-28V		1.25W							
RS232RX, TX OR RS485A, B	SERIAL INTERFACE with respect to signal return	C*	8 & 15 together wrt return	13	28V	0.4W	0.12A	0	0	6.44V	490mW	656mA	25uF	68uH
					15V		0.9A							
RS485A, B	SERIAL INTERFACE to Isolated barrier	C◇	8 wrt 15 or 15 wrt 8	none (isolated barrier)	28V	0.4W	0.12A	0	0	6.44V	285mW	177mA	25uF	1.135mH
					15V		0.9A							
REMOTE TARE	DISCRETE SWITCH INPUT (GND ACTIVE)	D	14	11	28V	N/A - BLOCKED WITH INFALLIBLE SERIES DIODES -★				6.44V	16mW	1mA	6.25uF	2.22uH
AUX DISCRETE 01			4								16mW	1mA	6.25uF	
AUX DISCRETE 02			3								16mW	1mA	6.25uF	
ANALOG SIGNAL IN	4-20mA, 0-5 OR 0-10V INPUT	E	12	11	28V	0.651W	93mA	0	0	6.44V	4mW	<1mA	6.5uF	2.22uH
4-20mA POWER IN	4-20mA POWER INPUT	F	6	5	28V	0.651W	93mA	0	0	N/A - BLOCKED WITH INFALLIBLE SERIES DIODES-★				
4-20mA SIGNAL OUT	4-20mA SIGNAL OUTPUT	F	7	5	28V	N/A - BLOCKED WITH INFALLIBLE SERIES DIODES				28V	0.651W	94mA	0.069uF	4.0239mH

* Each instrument is configured exclusively for RS232 or RS485 by internal jumpers. Use these parameters when using a barrier that is referenced to signal return.
◇ Use these parameters for RS485 with a 2-wire an isolated barrier that is not referenced to signal return.
★ N/A - BLOCKED WITH INFALLIBLE SERIES DIODES: Three suitably rated series diodes are used internal to the device to only allow current in one direction and block all current in the other direction. In the case of an output, this means there is no U_i, P_i, I_i, C_i or L_i. In the case of an input, this means there is no U_o, P_o, I_o, C_o or L_o

TABLE 01 - SUMMARY OF INDIVIDUAL ENTITY PARAMETERS

THE USER IS PERMITTED TO UTILIZE THE SUMMARY OF INDIVIDUAL ENTITY PARAMETERS IN TABLE 05 OF THIS DOCUMENT TO INTERPRET ADDITIONAL CONFIGURATIONS OF BARRIERS NOT SHOWN IN THE EXAMPLE CONFIGURATIONS. THE ENTITY CONCEPT MUST BE FOLLOWED. THIS IS THE RESPONSIBILITY OF THE INSTALLER TO INVOLVE PERSONEL SKILLED IN MAKING THE ASSESSMENT. (REF IEC 60079-14 A.2)

THE IS-Max or IS-Pro DESIGN IS SUCH THAT THE INTERFACES MAY BE GROUPED INTO THREE (3) SEPARATE INTRINSICALLY SAFE CIRCUITS CONSISTING OF CIRCUIT A, CIRCUIT B AND THE SUM OF THE CIRCUITS C, D, E AND F. THE SEPARATE CIRCUITS MAY ALSO BE COMBINED WHERE THE ASSOCIATED BARRIER(S) FIT WITHIN THE ENTITY PARAMETER CALCULATIONS.

THE ENTITY PARAMETERS FOR THE POWER CONNECTIONS ARE DEFINED IN TABLE 1, CIRCUITS A AND B. MAIN POWER (CIRCUIT A) IS ALWAYS NECESSARY. VALVE POWER (CIRCUIT B) IS OPTIONAL IN THE CASE OF A METER ONLY DEVICE. CIRCUIT A AND CIRCUIT B ARE SERVED BY SEPARATE BARRIERS OR CAN BE BOTH SUPPLIED BY A SINGLE BARRIER. FOR <15V, POWER IS INTERNALLY LIMITED PER THE SAFETY CONCEPT. FOR 15-28V, THE BARRIER POWER IS RESTRICTED TO 1.25W PER THE SAFETY CONCEPT.

12V MAXIMUM IS RECOMENDED FOR BEST VALVE PERFORMANCE (NOT A SAFETY REQUIREMENT).

THE ENTITY PARAMETERS FOR THE SERIAL CONNECTIONS ARE DEFINED IN TABLE 1 CIRCUIT C. EACH INSTRUMENT IS FACTORY CONFIGURED EXCLUSIVELY FOR RS232 OR FOR RS485 BY INTERNAL JUMPERS.

WHEN THE BARRIER IS RS485 AND HAS NO COMMON RETURN (ISOLATED), THE ENTITY PARAMETERS ONLY APPLY BETWEEN THE SIGNAL CONDUCTORS AND NOT TO RETURN.

THE ENTITY PARAMETERS FOR THE DISCRETE INPUT CONNECTIONS ARE DEFINED IN TABLE 1, CIRCUIT D. THESE SIGNALS ARE NOT REQUIRED TO BE SEPARATE INTRINSICALLY SAFE CIRCUITS FROM ANY OTHER CIRCUIT ON THE SIGNAL CONNECTOR. SIGNALS ARE ACTIVATED BY CONNECTION TO RETURN. THIS COULD BE A SIMPLE SWITCH CONTACT OR AN INTRINSICALLY SAFE RELAY OR DISCRETE OUTPUT BARRIER. THE SIGNALS ARE DIODE BLOCKED AND THUS PROTECTED FROM AN EXTERNAL U_m . THESE SIGNALS MAY HAVE ENTITY PARAMETERS COMBINED WITH OTHER SIGNALS IN THE SAME DEVICE.

ENTITY PARAMETERS FOR THE ANALOG INPUT CONNECTION IS DEFINED IN TABLE 1, CIRCUIT E. THE 4-20mA/0-5V/0-10V INPUT IS SOFTWARE SELECTED FOR VOLTAGE OR CURRENT, HOWEVER THE SELECTION DOES NOT AFFECT THE ENTITY PARAMETERS.

THE 4-20mA POWER IN/SIGNAL OUT CIRCUIT (CIRCUIT F) ACCEPTS POWER FROM A BARRIER (PIN 6), PROVIDES DIODE ISOLATION, ADDS 4-20mA CONTROL, AND DELIVERS THE CURRENT BACK OUT ON PIN 7. FOR THE EVALUATION OF ENTITY PARAMETERS, THE OUTPUT U_o/V_{oc} , I_o/I_{sc} , P_o FROM PIN 7 IS \leq THE ENTITY PARAMETERS OF THE BARRIER CONNECTED TO PIN 6.

	SIGNAL	WIRE COLOR	CONNECTOR PIN
CIRCUIT A	MAIN POWER (+)	ORANGE	10
	MAIN POWER RETURN	BLACK	9
CIRCUIT B	VALVE POWER (+)	RED	1
	VALVE POWER RETURN	BROWN	2
CIRCUIT C	SERIAL Rx/B	WHITE	8
	SERIAL Tx/A	BLACK+WHITE STRIPE	15
	SERIAL/DISCRETE SIGNAL RETURN	BROWN+WHITE STRIPE	11
CIRCUIT D	REMOTE TARE DISCRETE (+)	BLUE+WHITE STRIPE	14
	AUX DISCRETE 01 (+)	YELLOW	4
	AUX DISCRETE 02 (+)	GREEN	3
CIRCUIT E	ANALOG IN SIGNAL RETURN	GREEN+WHITE STRIPE	13
	ANALOG SIGNAL IN (+)	RED+WHITE STRIPE	12
CIRCUIT F	4-20mA POWER IN (+)	PURPLE	6
	4-20mA SIGNAL OUT (+)	GRAY	7
	4-20mA POWER/SIGNAL RETURN	BLUE	5

TABLE 02 - ALICAT SUPPLIED CABLE PIN OUT AND COLOR CODES

MAXIMUM CABLE ENTITY VALUES OF 550pF/meter, 1 μ H/meter for individual wires w/respect to return and 5.3 μ H/ Ω for dedicated circuit A pair and/or circuit B pair.

GENERAL NOTES:

1. CONTROL EQUIPMENT CONNECTED TO BARRIER MUST NOT USE OR GENERATE MORE THAN 250V
2. APPROVED BARRIERS MUST BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.
3. THIS IMPLEMENTATION UTILIZES A CABLE CONTAINING MORE THAN ONE INTRINSICALLY SAFE CIRCUIT (REF IEC 60079-25 8.3). USE ONLY ALICAT SPECIFIED CABLE. THE ALICAT SPECIFIED CABLE IS IN ACCORDANCE WITH THE REQUIREMENTS OF A MULTI-CIRCUIT CABLE TYPE A OR TYPE B, AS SPECIFIED IN IEC 60079-14. THE ALICAT SUPPLIED CABLE IS CONSTRUCTED WITH SOLID INSULATION PER IEC 60079-11 EDITION 6 TABLE 5, FOR <30V, WHERE APPROPRIATE SEPARATION IS APPLIED IN ORDER TO FACILITATE CERTIFICATION WITH MULTIPLE INTRINSICALLY SAFE CIRCUITS IN ONE CABLE.
4. **THE ALICAT SUPPLIED CABLE FOLLOWS THE MAXIMUM ENTITY VALUES OF 550pF/meter, 1µH/meter for all single wires. L/R is specified only for circuits A and B. In this case, the circuit A Red/Brown pair is 5.3µH/Ω and the circuit B Orange/Black pair is also 5.3µH/Ω. All other wires do not have a stated L/R.**
WHERE A BARRIER OMITTS A PARAMETER, THAT PARAMETER IS NOT REQUIRED. FOR EXAMPLE, A CERTAIN IS POWER SUPPLY CERTIFICATE STATES A MAXIMUM VALUE FOR L/R WITHOUT STATING L. THIS MEANS THAT ONLY L/R NEEDS TO BE CONSIDERED AND AN EQUIVALENT L VALUE NEED NOT BE ASSUMED OR INFERRED. LIKewise, ANOTHER IS POWER SUPPLY CERTIFICATE STATES L WITHOUT STATING L/R. IN THIS CASE AN EQUIVALENT L/R VALUE NEED NOT BE ASSUMED OR INFERRED.
5. ALL SIGNAL RETURNS ARE CONNECTED TOGETHER INTERNAL TO THE IS-Max or IS-Pro. THE INTERNAL CONNECTIONS ARE ISOLATED FROM CHASSIS. AS A RESULT, EXTERNAL VOLTAGES DO NOT NEED TO BE SUMMED.
6. ALL WIRING MUST RUN SEPARATELY IN THE ALICAT SUPPLIED CABLE AND TERMINATED AT THE BARRIER(S). MODIFICATION OF THE CABLE (OTHER THAN LENGTH) IS NOT PERMITTED.
8. NON-GALVANICALLY ISOLATED BARRIERS MUST BE CO-LOCATED AND MUST TERMINATE SAFETY GROUNDS TO THE SAME PHYSICAL EARTHING CONNECTION OR GROUNDING ROD. SEPARATED GROUNDS ARE NOT PERMITTED.
9. WHERE GALVANICALLY NON-ISOLATED BARRIERS ARE USED, THE INSTALLER MUST CONSIDER THAT RETURN CURRENT MAY BE SUMMED FOR ALL NON-ISOLATED BARRIERS (REF IEC 60079-25 ANNEX B). THE SUM OF THE CURRENTS FOR 2 OR MORE NON-GALVANICALLY ISOLATED BARRIERS CANNOT NOT EXCEED IEC 60079-11 TABLE A.2 AT THE VOLTAGE FOR THE HIGHER OR HIGHEST OF THE BARRIERS IN USE. THIS IS THE RESPONSIBILITY OF THE INSTALLER TO INVOLVE PERSONEL SKILLED IN MAKING THE ASSESSMENT. (REF IEC 60079-14 A.2)
10. INSTALL PER EN 60079-14, IEC 60079-14, ANSI/ISA-RP12.6, ANSI/NFPA 70 (US NATIONAL ELECTRICAL CODE), CSA C22.1 (CANADIAN ELECTRICAL CODE) (AS APPLICABLE) AND APPLICABLE LOCAL INSTALLATION CODES.
11. THE USER IS PERMITTED TO UTILIZE THE SUMMARY OF INDIVIDUAL ENTITY PARAMETERS IN TABLE 01 OF THIS DOCUMENT TO INTERPRET ADDITIONAL CONFIGURATIONS OF BARRIERS NOT SHOWN IN THE EXAMPLE CONFIGURATIONS. THE ENTITY CONCEPT MUST BE FOLLOWED. THIS IS THE RESPONSIBILITY OF THE INSTALLER TO INVOLVE PERSONEL SKILLED IN MAKING THE ASSESSMENT. (REF IEC 60079-14 A.2)
12. REFER TO THE ALICAT SCIENTIFIC INSTRUCTION MANUAL FOR ADDITIONAL REQUIREMENTS AND APPLICATION EXAMPLES.
13. WARNING - SUBSTITUTION OF COMPONENTS MAY IMPAIR INTRINSIC SAFETY.
AVERTISSEMENT: LA SUBSTITUTION DE COMPOSANTS PEUT COMPROMETTRE LA SÉCURITÉ INTRINSÈQUE.
14. WARNING: EXPLOSION HAZARD – DO NOT DISCONNECT EQUIPMENT UNLESS PRIMARY POWER HAS BEEN SWITCHED OFF OR THE AREA IS KNOWN TO BE NON-HAZAROUS