



DUAL INPUT LCD PROCESS INDICATOR

Model : PI 590 - 2

INSTRUCTION MANUAL

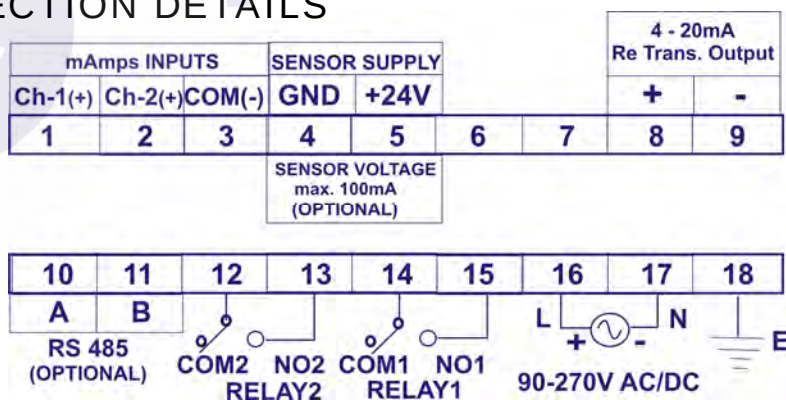


1. SPECIFICATION

Model	PI 590 - 2
Display	16 Character X 2 Line LCD Display
Input	mAmps
Input Range	0 to 21 mA DC (scalable)
Parameter Title (selectable)	3 char. titles from 95 Alphanumeric characters
Unit(selectable)	5 char. units from 95 Alphanumeric characters
Display mode	1 st Line→ Difference(Ch1-Ch2), 2 nd Line → Ch1 & Ch2 reading
Display Range(scalable)	-19999 to 40000 counts (or) 0 to 60000 counts (any one is possible)
Resolution	1 / 0.1 / 0.01 / 0.001 / 0.0001 (selectable)
Relay Output (optional)	2 Relay Output (5A rated) with 4 relay status(selectable)
Retrans. Output(optional)	Isolated 4 – 20mA or 0 to 10V.(any one factory configurable)
Alarm Output(optional)	Relay(5A rated) or Buzzer
Alarm reset(optional)	Provided on front key
Communication	RS 485(2 wire)
Comm. Protocol	MODBUS RTU Protocol
Slave ID	1 to 32 (selectable)
Baud Rate (bps)	9600, 19200 (selectable)(57600 & 115200 optional on request)
Parity	None, Odd, Even (selectable)
Sensor Supply	5 / 12 / 24V DC / 100mA Max.(any one factory configurable)
Accuracy	± 0.1% of FS at 25 Deg C
Operating Environment	0 to 50 Deg C / 20 to 95 % RH Non Condensing
Power Supply	90 to 270 V AC 50/60 Hz
Overall Dimension	96 x 96 x 85 mm(W x H x D)
Mounting	Panel mountable
Weight	300 gram (Approx.)

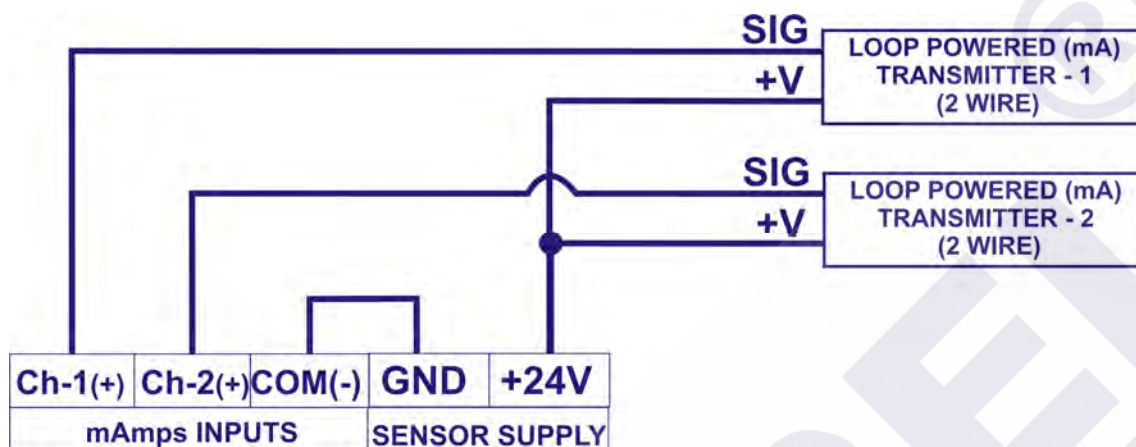
Note: Due to continuous product improvements, Published specifications may change with out notice

2. CONNECTION DETAILS

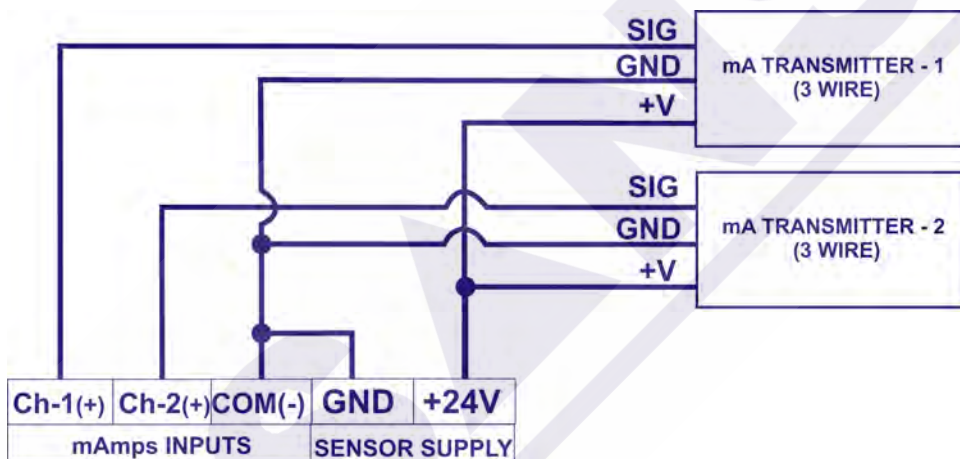


3. WIRING DETAILS

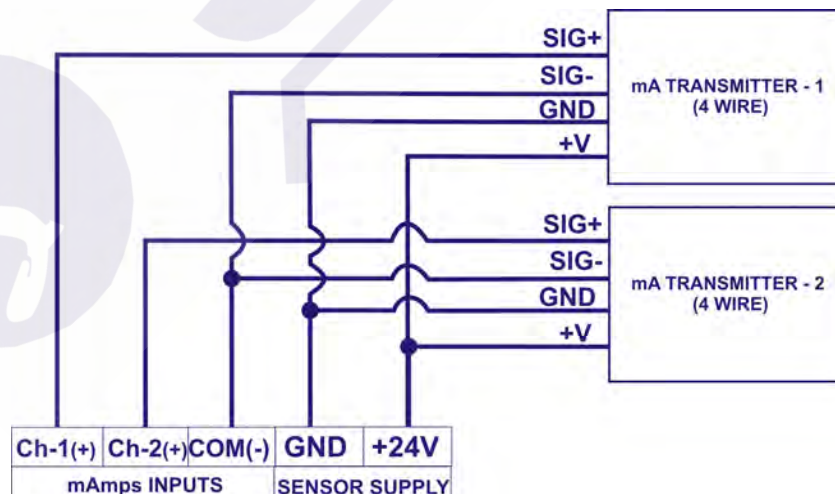
3.1. LOOP POWERED (mA) TRANSMITTER (2 wire)



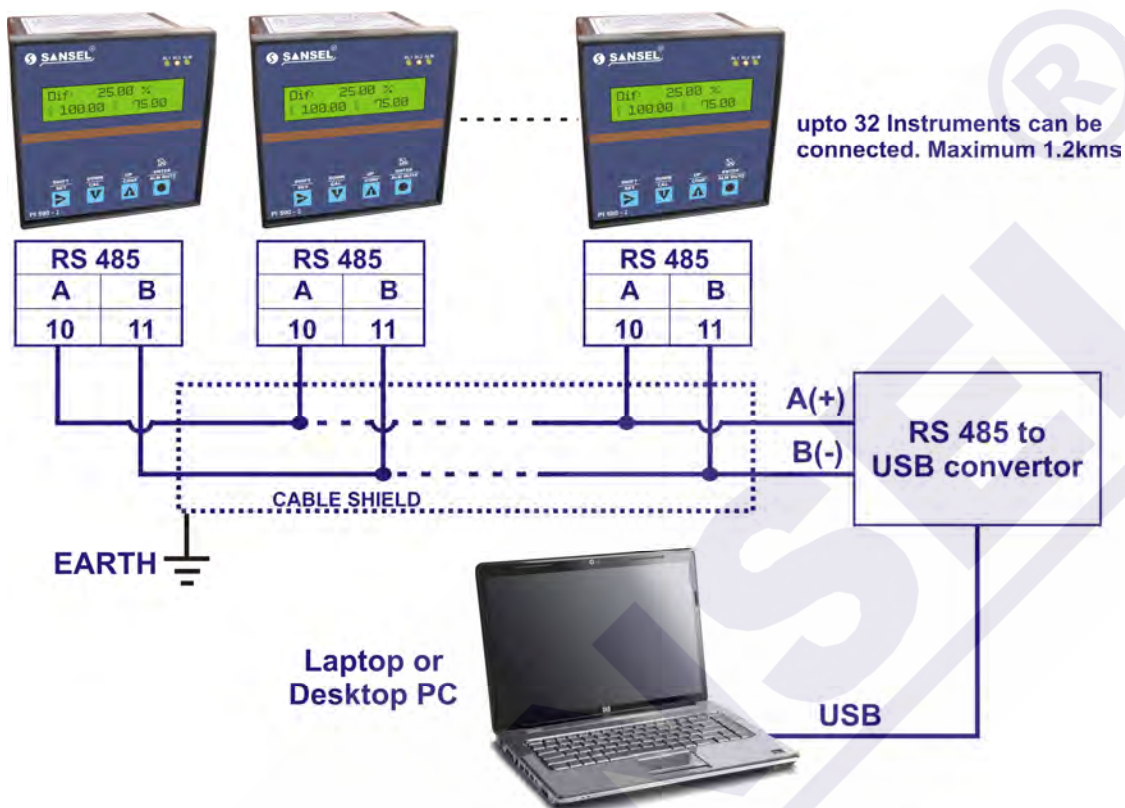
3.2. CURRENT(mA) TRANSMITTER (3 wire)



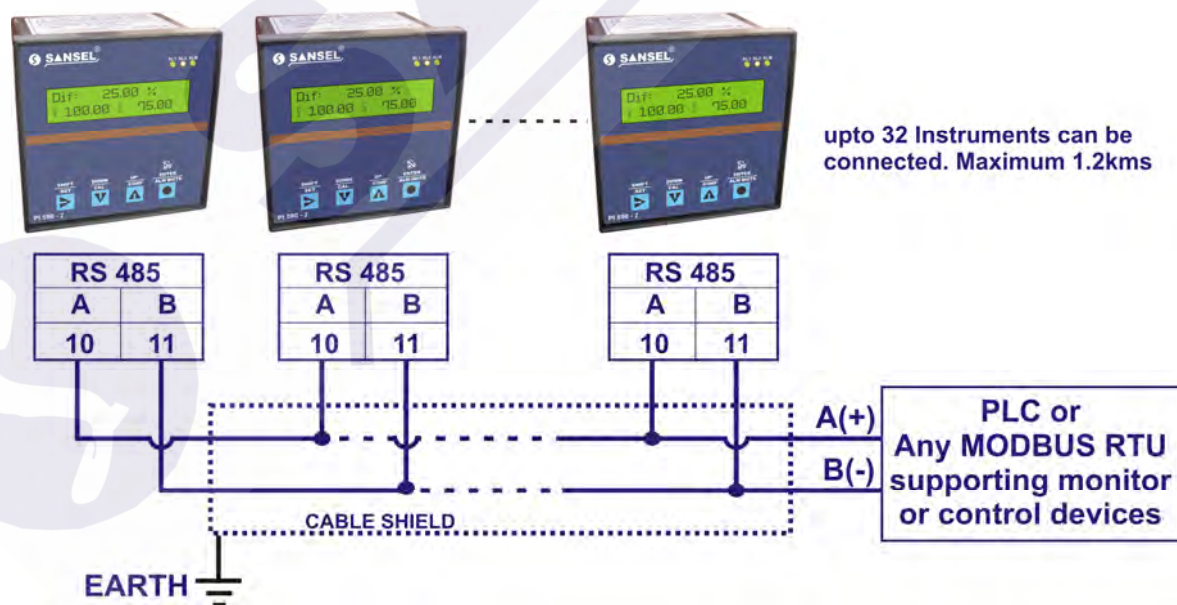
3.3. CURRENT(mA) TRANSMITTER (4 wire)



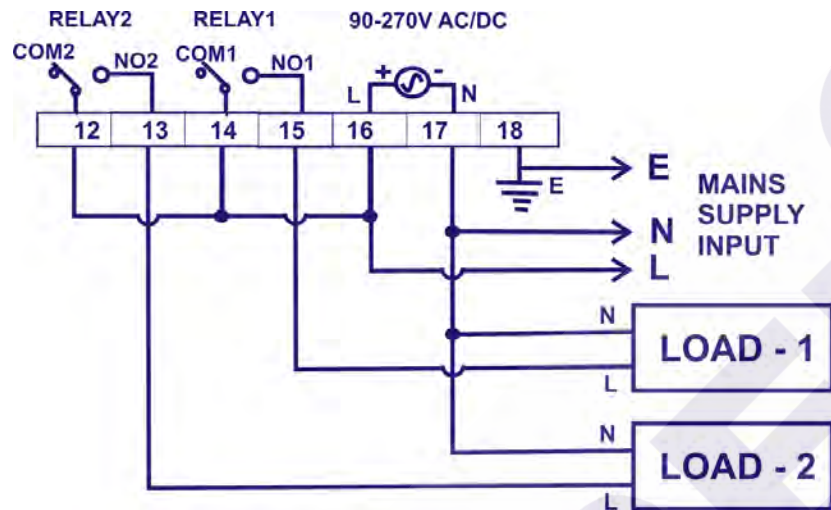
3.4. PC COMMUNICATION THROUGH RS 485



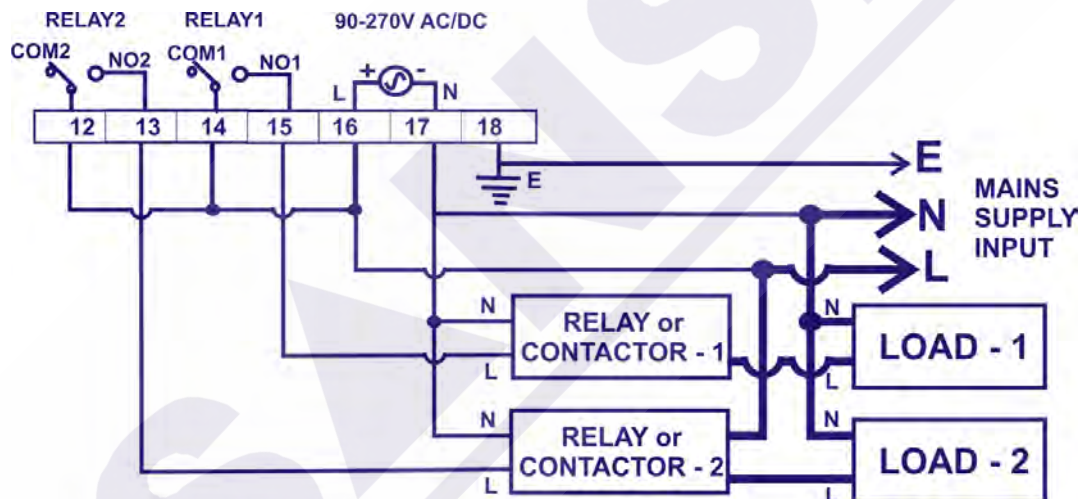
3.5. PLC or OTHER RS 485 MODBUS RTU supporting Device connection



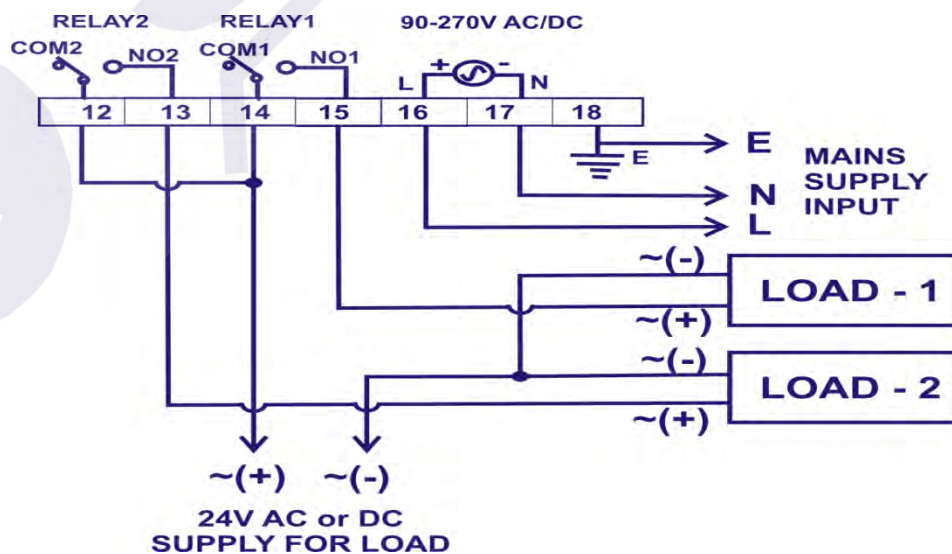
3.6. WIRING OF RELAY OUTPUT TO LOAD (SUPPLY 230V AC / BELOW 1kW LOAD)



3.7. WIRING OF RELAY OUTPUT TO LOAD (SUPPLY 230V AC / ABOVE 1kW LOAD)

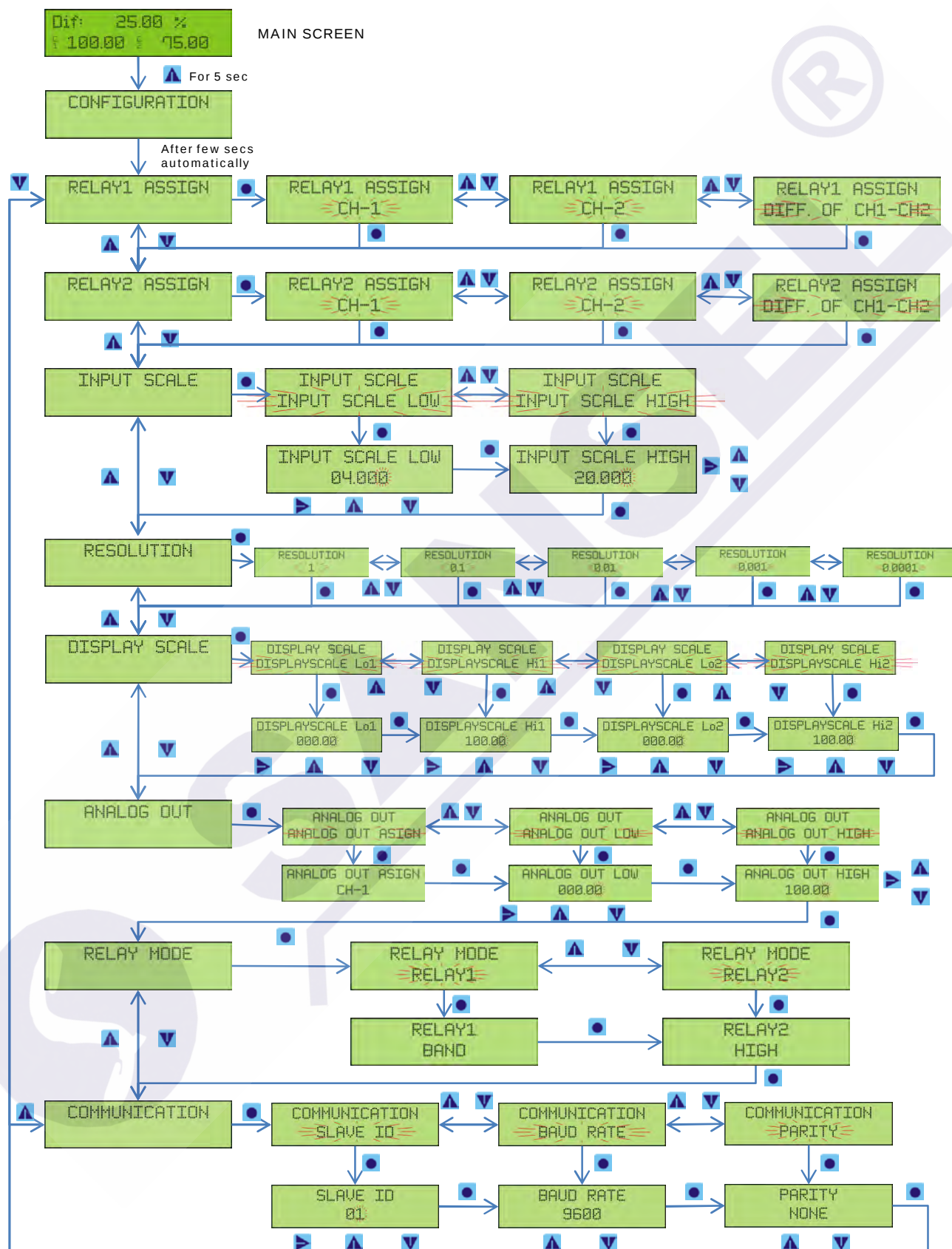


3.8. WIRING OF RELAY OUTPUT TO LOAD (SUPPLY 24V AC / DC)

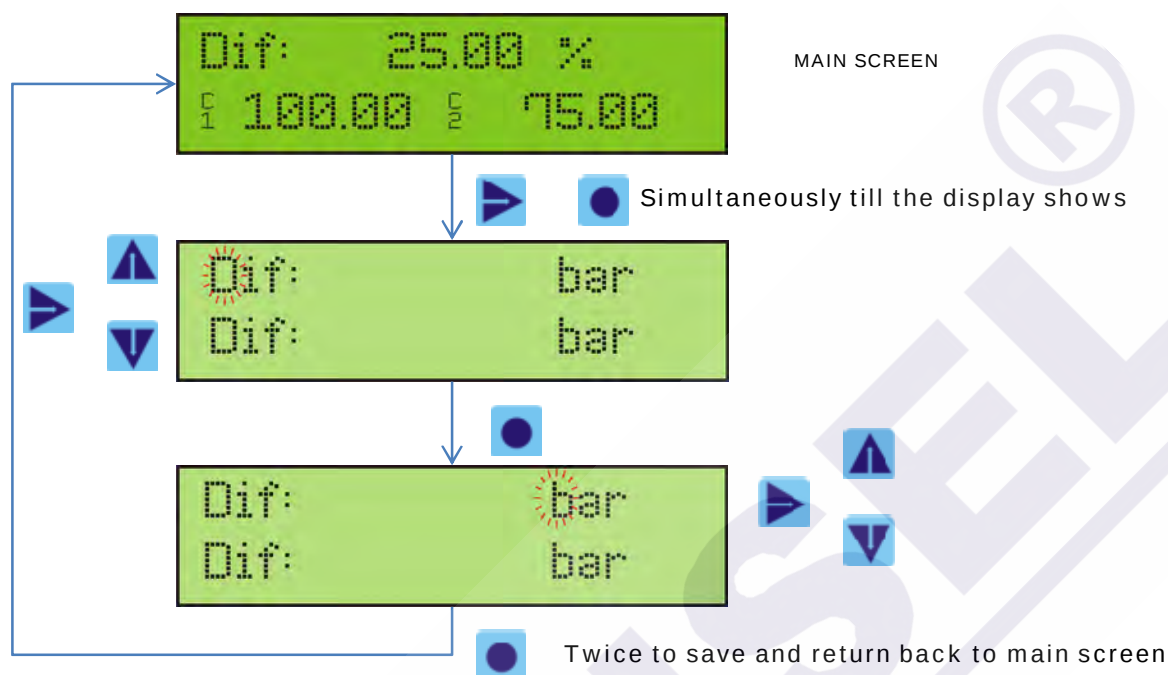


4. PROGRAMMING AND CONFIGURATION

4.1. MAIN CONFIGURATION



4.2. TITLE AND UNIT SETTING



4.3. List of alphanumeric symbols available in PI 590 - 2

Modbus Code	Character	Modbus Code	Character	Modbus Code	Character	Modbus Code	Character
32	Space	56	8	80	P	104	h
33	!	57	9	81	Q	105	i
34	"	58	:	82	R	106	j
35	#	59	;	83	S	107	k
36	\$	60	<	84	T	108	l
37	%	61	=	85	U	109	m
38	&	62	>	86	V	110	n
39	'	63	?	87	W	111	o
40	(	64	@	88	X	112	p
41	)	65	A	89	Y	113	q
42	*	66	B	90	Z	114	r
43	+	67	C	91	[	115	s
44	,	68	D	92	¥	116	t
45	-	69	E	93	]	117	u
46	.	70	F	94	^	118	v
47	/	71	G	95	_	119	w
48	0	72	H	96	`	120	x
49	1	73	I	97	a	121	y
50	2	74	J	98	b	122	z
51	3	75	K	99	c	123	{
52	4	76	L	100	d	124	
53	5	77	M	101	e	125	}
54	6	78	N	102	f	126	→
55	7	79	O	103	g		

5. CALIBRATION PROCEDURE FOR PI 590 – 2

For better accuracy, Calibration of the PI 590 – 2 is recommended. In addition, the PI 590 – 2 must be recalibrated whenever:

- a. The sensor is replaced.
- b. After testing long term in high temperature.
- c. Where high accuracy is required.
- d. At least twice an year.

NOTE : For Best results, calibrate with certified accurate standard source. Follow the steps given below to field calibrate the PI 590 - 2. PI 590 - 2 has a 2 POINT(zero & span) calibration.

STEP 1 : Adjust “Process Variable(PV)” using standard source to give a constant minimum Input(for current I/P – 4mA, Voltage I/P – 0V)

STEP 2 : Measure PV for a test time period (e.g. 1 mins)

STEP 3 : If error occurs in the minimum reading(0.0 bar), adjust the error using following steps, otherwise ignore it.

STEP 4 : In Main Screen, to Enter into the “Zero Calibration” Mode, Press CAL Key for 5 secs the Display Shows



ZERO CAL CH-1

STEP 5 : Then press ENTER Key again to enter into the “ Zero Calibration” as follows



ZERO CAL CH-1
100 bar

STEP 6 : Then use UP & DOWN keys to adjust the error reading to master reading and press ENTER Key again to save and enter into the “ Span Calibration”.

STEP 7 : Adjust PV using mA source to give a constant maximum PV.

STEP 8 : Measure PV for a test time period (e.g. 1 mins)

STEP 9 : If error occurs in the maximum PV reading, adjust the error using following steps, otherwise ignore it.



SPAN CAL CH-1

STEP 10 : Then use UP & DOWN keys to adjust the error reading to master reading and press ENTER Key again to save and return to “Main screen” after successfully calibration.

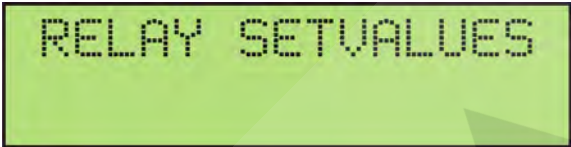


Dif: 25.00 bar
C 1 100.00 S 75.00

6. RELAY SETVALUE SETTING

This RELAY setvalues used to alert the local operator by glowing audible buzzer attached inbuilt(optional) in PI 590 – 2 & also used to control any process using relay contact(5A rated). To configure the “RELAY SETVALUES” follow the steps below.

STEP 1 : In Main Screen, Press SET Key till the Display Shows



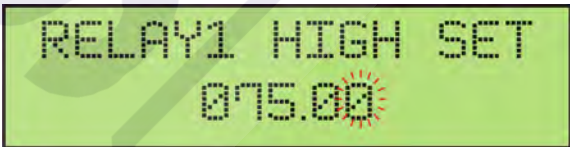
RELAY SETVALUES



RELAY1 LOW SET
025.00

AFTER FEW SEC AUTOMATICALLY DISPLAYS

STEP 2 : In “RELAY1 LOW SET” screen, press UP & DOWN keys to scroll the blinking digit(between 0 – 9) & move using SHIFT key and set the desire “RELAY1 LOW SET”. Then press ENTER key to save & enter into to “RELAY1 HIGH SET” screen as follows.



RELAY1 HIGH SET
075.00

STEP 3 : In “RELAY1 HIGH SET” screen, press UP & DOWN keys to scroll the blinking digit(between 0 – 9) & move using SHIFT key and set the desire “RELAY1 HIGH SET”. Then press ENTER key to save & enter into to “RELAY2 LOW SET” screen as follows.



RELAY2 LOW SET
025.00

STEP 4 : In “RELAY2 LOW SET” screen, press UP & DOWN keys to scroll the blinking digit(between 0 – 9) & move using SHIFT key and set the desire “RELAY2 LOW SET”. Then press ENTER key to save & enter into to “RELAY2 HIGH SET” screen as follows.



STEP 5 : In “RELAY2 HIGH SET” screen, press UP & DOWN keys to scroll the blinking digit(between 0 – 9) & move using SHIFT key and set the desire “RELAY2 HIGH SET”. Then press ENTER key to save & exit to Main screen as follows.



NOTE : IN ABOVE “RELAY SETVALUES” RESPECTED SETVALUES ONLY APPEAR AS PER SELECTED “RELAY MODES”(REF. 10).

7. DIGITAL COMMUNICATION

NOTE : It will works only, if the “DIGITAL COMMUNICATION OUTPUT” will enable on Hardware on factory.

7.1. MODBUS ADDRESSES

This is a complete list of parameters MODBUS Addresses available in the PI 590 – 2 .

Parameter	Address (Lower word)	Address (Higher word)	Data format	Function	Actual value count(A)	Factor *	Description
Process value (PV) difference	158	159	long integer	Read only	-19999 to 50000	See Table**	Actual reading of PV - difference
Process value - channel1	0	1	long integer	Read & write	-19999 to 50000		Actual reading of PV – Channel - 1
Process value - channel2	2	3	long integer	Read & write	-19999 to 50000		Actual reading of PV – Channel - 2
Relay 1 low set	4	5	long integer	Read & write	As per Display scale limit		Relay 1 low set value
Relay 1 high set	6	7	long integer	Read & write			Relay 1 High set value
Relay 2 low set	8	9	long integer	Read & write			Relay 2 low set value
Relay 2 high set	10	11	long integer	Read & write			Relay 2 High set value
Analog Input low	12	13	long integer	Read & write	-199999 to 200000	= A /1000	Analog Input Low Limit Value
Analog Input high	14	15	long integer	Read & write	-199999 to 200000		Analog Input High Limit Value
Display Scale Low1	16	17	long integer	Read & write	-19999 to 50000	See Table**	Display Scale Low1 Limit Value
Display Scale high1	18	19	long integer	Read & write	-19999 to 50000		Display Scale High1 Limit Value

Parameter	Address (Lower word)	Address (Higher word)	Data format	Function	Actual value count(A)	Factor *	Description
Display Scale Low2	20	21	long integer	Read & write	-19999 to 50000	See Table**	Display Scale Low1 Limit Value
Display Scale high2	22	23	long integer	Read & write	-19999 to 50000		Display Scale High1 Limit Value
Analog Output Low	150	151	long integer	Read & write	-19999 to 50000		Analog Output Low Value
Analog Output High	152	153	long integer	Read & write	-19999 to 50000		Analog Output High Value
Relay 1 assign	48		integer	Read & write	0 to 2	=A/1	0 → CH1, 1 → CH2, 2 → DIFF. OF CH1 & CH2
Relay 2 assign	49		integer	Read & write	0 to 2	=A/1	0 → CH1, 1 → CH2, 2 → DIFF. OF CH1 & CH2
Resolution	50		integer	Read & write	0 to 4	=A/1	0 → 1, 1 → 0.1, 2 → 0.01, 3 → 0.001, 4 → 0.0001
Analog out assign	51		integer	Read & write	0 to 2	=A/1	0 → CH1, 1 → CH2, 2 → DIFF. OF CH1 & CH2
Relay 1 Mode	52		integer	Read & write	0 to 4	=A/1	0 → off, 1 → low, 2 → high, 3 → high/low, 4 → band
Relay 2 Mode	53		integer	Read & write	0 to 4	=A/1	0 → off, 1 → low, 2 → high, 3 → high/low, 4 → band
Title 1st digit	57		integer	Read & write	32 to 126	=A/1	Refer 4.3 alphanumeric symbol Character code
Title 2nd digit	58		integer	Read & write	32 to 126	=A/1	Refer 4.3 alphanumeric symbol Character code
Title 3rd digit	59		integer	Read & write	32 to 126	=A/1	Refer 4.3 alphanumeric symbol Character code
Unit 1st digit	60		integer	Read & write	32 to 126	=A/1	Refer 4.3 alphanumeric symbol Character code
Unit 2nd digit	61		integer	Read & write	32 to 126	=A/1	Refer 4.3 alphanumeric symbol Character code
Unit 3rd digit	62		integer	Read & write	32 to 126	=A/1	Refer 4.3 alphanumeric symbol Character code
Unit 4th digit	63		integer	Read & write	32 to 126	=A/1	Refer 4.3 alphanumeric symbol Character code
Unit 5th digit	64		integer	Read & write	32 to 126	=A/1	Refer 4.3 alphanumeric symbol Character code
Relay – 1 ON status	73.0		bit	Read only	0 to 1	=A/1	0 → Relay ON, 1 → Relay OFF
Relay – 2 ON status	73.1		bit	Read only	0 to 1	=A/1	0 → Relay ON, 1 → Relay OFF

Note : *Read Final value of any above parameter, after applying the “Actual read” to “Factor” given.

** Read Final value of some selected parameters above, as per table below.

Resolution	Factor**
1	=A/1
0.1	=A/10
0.01	=A/100
0.001	=A/1000
0.0001	=A/10,000

7.2. MODBUS MASTER QUERY AND RESPONSE FEEDBACKS FROM PI 590 – 2

PI 590 – 2 supports the RTU Mode in MODBUS communications. This device acts like a slave device in the MODBUS network. The slave address with which the unit is Configurable(Ref. 4.1) between 1 to 32(decimal). PI 590 – 2 supports functions 03 of the MODBUS protocol.

7.2.1.COMMUNICATION PARAMETERS:

Baud Rate : 9600(Configurable Ref. 4.1)
 Flow Control : NONE
 No of data bits : 8
 Parity : NONE(Configurable Ref. 4.1)
 No of Stop Bits : 1(Configurable Ref. 4.1)

7.2.2. SUPPORTED FUNCTIONS AND SCOPE:

Function 03 – Read Holding registers

7.2.3. QUERY FROM MASTER DEVICE (For Long Integer Data formats)

Field Name	Example (Hex)
Slave Address	01
Function	03
Start Address Hi (Refer 7.2.7)	00
Start Address Lo (Refer 7.2.7)	00
No of Registers to read Hi	00
No of Registers to read Lo	02
Error Check	CRC

The above example is a typical example of supported format for function # 03.

7.2.4. RESPONSE FROM PI 590 – 2 (For Long Integer Data formats)

Field Name	Example (Hex)
Slave Address	01
Function	03
Byte Count	04
Data Hi1	xx
Data Lo1	xx
Data Hi2	xx
Data Lo2	xx
Error Check	CRC

7.2.5. QUERY FROM MASTER DEVICE (For Integer Data formats)

Field Name	Example (Hex)
Slave Address	01
Function	03
Start Address Hi(Refer 7.2.7)	00
Start Address Lo(Refer 7.2.7)	30
No of Registers to read Hi	00
No of Registers to read Lo	01
Error Check	CRC

The above example is a typical example of supported format for function # 03.

7.2.6. RESPONSE FROM PI 590 – 2 (For Integer Data formats)

Field Name	Example (Hex)
Slave Address	01
Function	03
Byte Count	02
Data Hi	xx
Data Lo	xx
Error Check	CRC

7.2.7. MODBUS QUERY LIST IN HEX DECIMAL(hex)

Parameter	Function	Address		No. of Registers to Read Hi	No. of Registers to Read Lo
		Start Address Hi	Start Address Lo		
Process value (PV) difference	03	00	9E	00	02
Process value - channel1	03	00	00	00	02
Process value - channel2	03	00	02	00	02
Relay 1 low set	03	00	04	00	02
Relay 1 high set	03	00	06	00	02
Relay 2 low set	03	00	08	00	02
Relay 2 high set	03	00	0A	00	02
Analog Input low	03	00	0C	00	02
Analog Input high	03	00	0E	00	02
Display Scale Low1	03	00	10	00	02
Display Scale high1	03	00	12	00	02

Parameter	Function	Address		No. of Registers to Read Hi	No. of Registers to Read Lo
		Start Address Hi	Start Address Lo		
Display Scale Low2	03	00	14	00	02
Display Scale high2	03	00	16	00	02
Analog Output Low	03	00	96	00	02
Analog Output High	03	00	98	00	02
Relay 1 assign	03	30		00	01
Relay 2 assign	03	31		00	01
Resolution	03	32		00	01
Analog out assign	03	33		00	01
Relay 1 Mode	03	34		00	01
Relay 2 Mode	03	35		00	01
Title 1st digit	03	39		00	01
Title 2nd digit	03	3A		00	01
Title 3rd digit	03	3B		00	01
Unit 1st digit	03	3C		00	01
Unit 2nd digit	03	3D		00	01
Unit 3rd digit	03	3E		00	01
Unit 4th digit	03	3F		00	01
Unit 5th digit	03	40		00	01
Relay – 1 ON status	03	49(bit – 0)		00	01
Relay – 2 ON status	03	49(bit – 1)		00	01

7.2.8. MORE ON UNSUPPORTED FUNCTIONS:

Unsupported functions will not return a response from PI 590 – 2 . However continuing development will ensure that more Functions will be added to this model in future releases. For specific Functional requirements please contact us.

8. CONTACT US

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