

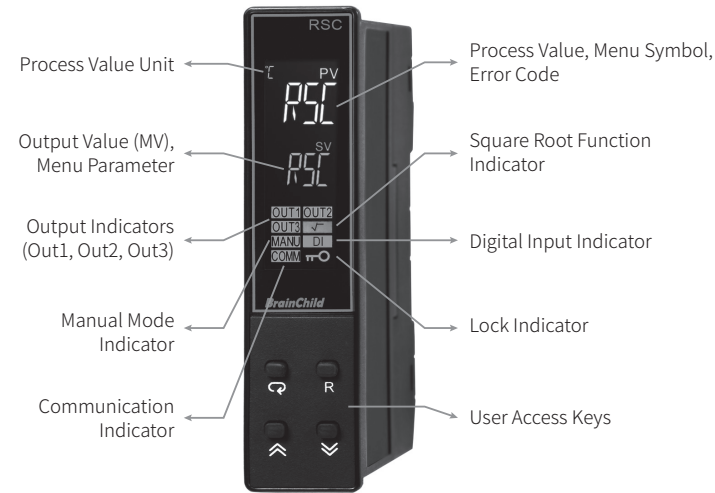
BrainChild

Multifunctional Signal Conditioner RSC

Quick Start Manual

Model: RSC Ver. UMQORSC1A

1. DISPLAY AND KEYS



During power-up, the upper display will show PROG and the lower display will show the firmware version for 6 seconds. There are 4 keys available for the user to operate as explained below.

SCROLL KEY or ENTER KEY: This key is used to select a parameter to be viewed or adjusted.

UP KEY: ▲ This key is used to increase the value of the selected parameter.

DOWN KEY: This key is used to decrease the value of the selected parameter.

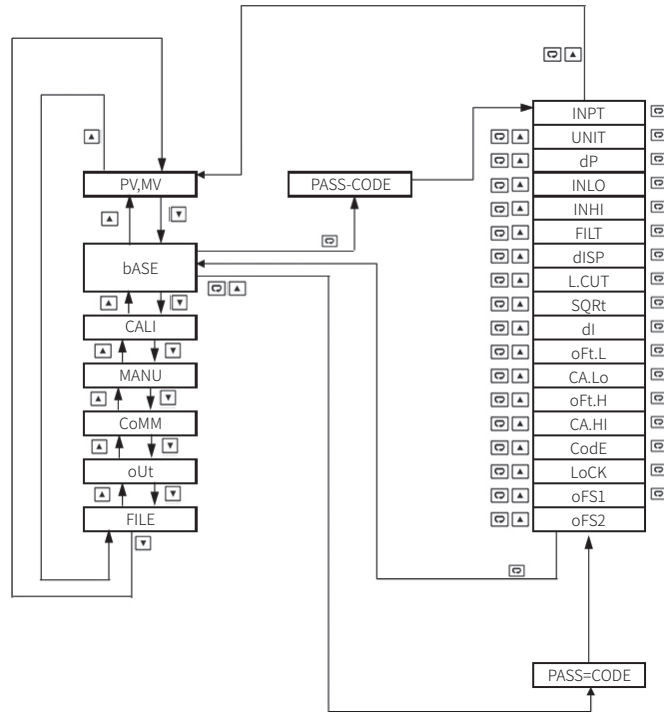
RESET KEY:  This key is used to revert the display to the home screen.

2. MENU FLOW CHART

The menu has been divided into 5 groups. They are Basic Menu (bASE), Output Menu (oUt), Communication Menu (CoMM), Manual Mode Menu (MANU), Calibration Menu (CALI).

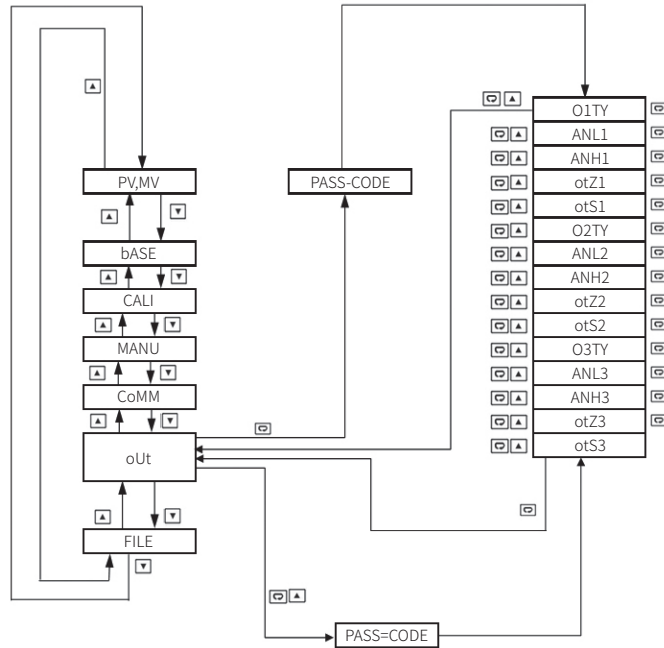
2.1 BASIC MENU (bASE)

Use or key to get bASE in the lower display then use key to enter to Base menu parameters.



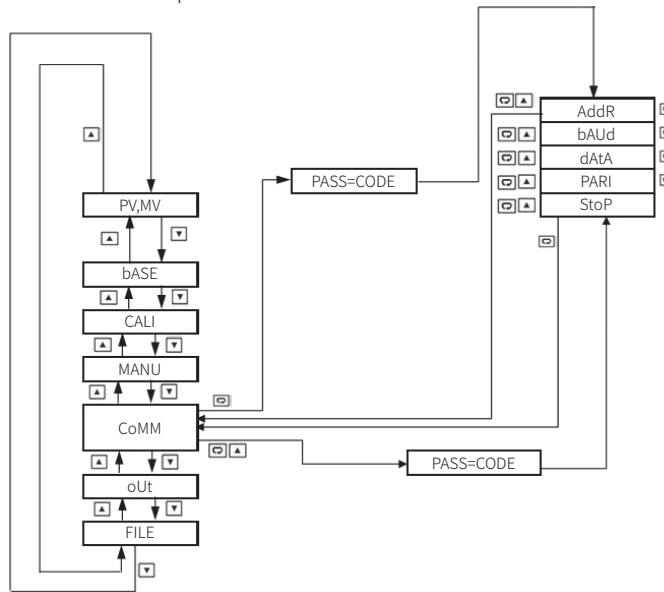
2.2 OUTPUT MENU (oUt)

Use  or  key to get oUt in the lower display then use  key to enter to output menu parameters.



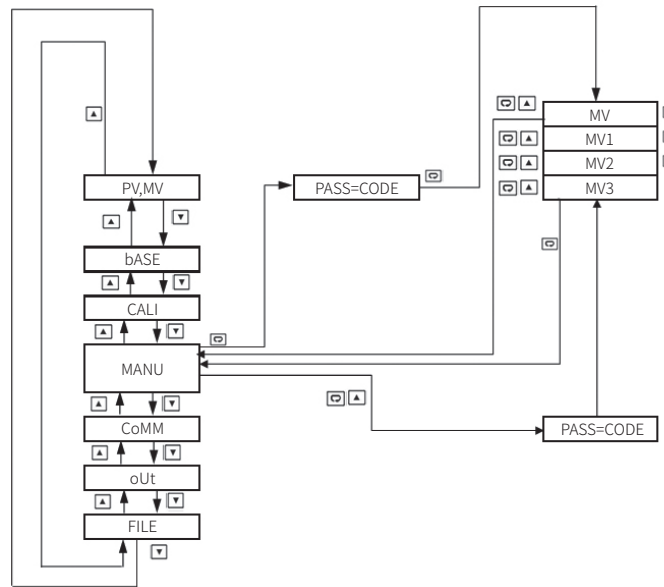
2.3 COMMUNICATION MENU (CoMM)

Use or key to get CoMM in the lower display then use key to enter into communication menu parameters.



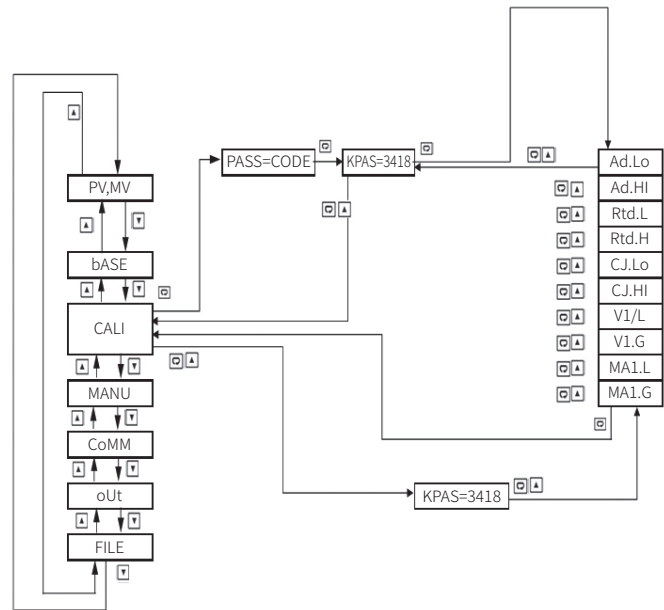
2.4 MANUAL MODE MENU (MANU)

Use  or  key to get MANU in the lower display then use  key to enter into Manual Mode parameters.



2.5 CALIBRATION MENU (CALI)

Use  or  key to get CALI in the lower display then use  key to enter into Calibration Mode parameters.



Note: The flow chart shows a complete list of all parameters. For actual application, the number of available parameters will vary depending on the setup and will be less than that shown in the flow chart.

3. PARAMETERS DESCRIPTION

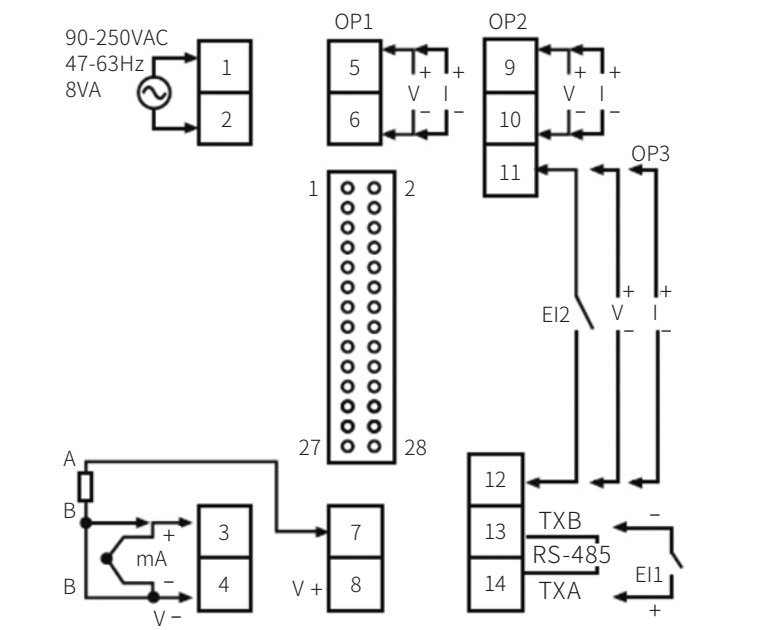
Modbus Register Address	Parameter Notation	Parameter Description	Range	Default Value	Data Type	Scale Low	Scale High
0	PASS	Security Password	Low: 0 High: 9999	0	R/W	0	65535
1	INPT	Input sensor selection	0 J_tc: J type Thermocouple 1 K_tc: K type Thermocouple 2 T_tc: T type Thermocouple 3 E_tc: E type Thermocouple 4 B_tc: B type Thermocouple 5 R_tc: R type Thermocouple 6 S_tc: S type Thermocouple 7 N_tc: N type Thermocouple 8 L_tc: L type Thermocouple 9 U_tc: U type Thermocouple 10 P_tc: P type Thermocouple 11 C_tc: C type Thermocouple 12 D_tc: D type Thermocouple 13 Pt.dN: PT100Ω DIN curve 14 Pt.JS: PT 100Ω JIS curve 15 4-20: 4 - 20 mA input 16 0-20: 0 - 20 mA input 17 0-50: 0 - 50 mV input 18 0-60: 0 - 60 mV input 19 0-5V: 0 - 5V input 20 1-5V: 1 - 5V input 21 0-10: 0 - 10V input	15	R/W	0	65535
2	UNIT	Input unit selection	0 oC: ° C unit 1 oF: ° F unit 2 Pu: Process unit	0	R/W	0	65535
3	DP	Decimal point selection	0 No.dP: No decimal point 1 1-dP: 1 decimal digit 2 2-dP: 2 decimal digits 3 3-dP: 3 decimal digits	1	R/W	0	65535
4	IN.Lo	Input low scale value	Low: -19999 High: 45536 IN.Lo ≠ IN.HI	-17.8° C (0.0° F)	R/W	-19999	45536
5	IN.HI	Input high scale value	Low: -19999 High: 45536 IN.Lo ≠ IN.HI	37.8° C (100.0° F)	R/W	-19999	45536

Modbus Register Address	Parameter Notation	Parameter Description	Range	Default Value	Data Type	Scale Low	Scale High
6	FILT	Filter damping time constant of PV	0 0: 0 second time constant 1 0.2: 0.2 second time constant 2 0.5: 0.5 second time constant 3 1: 1 second time constant 4 2: 2 second time constant 5 5: 5 second time constant 6 10: 10 second time constant 7 20: 20 second time constant 8 30: 30 second time constant 9 60: 60 second time constant	2	R/W	0	65535
7	DISP	MV display selection	0 MV1: Display MV1 1 MV12: Display MV1 & MV2 2 CYCL: Display all MV cycled	0	R/W	0	65535
8	LCUT	Input low cutvalue	-1 OFF or Low: 0 High: 20000 for ° C Low: 0 High: 36000 for ° F	OFF	R/W	-19999	45536
9	SQRT	Square root function	0 oFF: Square root disable 1 oUt1: Square root enable for output 1 2 ot.12: Square root enable for output 1 and output 2 3 ALL: Square root enable for all outputs	0	R/W	0	65535
10	DI	Digital input function	0 NoNE: None 1 MA.Ho: Hold max value of PV 2 DA.Ho: Hold current value of PV 3 ZERo: Force PV to 0	0	R/W	0	65535
11	OFTL	Offset value for low point calibration	Low: -1999 High: 1999	0	R/W	-19999	45536
12	CALO	Input signal value during low point calibration	Low: -19999 High: 45536 CALO ≠ CAHI	0	R/W	-19999	45536
13	OFTH	Offset value for high point calibration	Low: -1999 High: 1999	0	R/W	-19999	45536
14	CAHI	Input signal value during high point calibration	Low: -19999 High: 45536 CAHI ≠ CALO	1000	R/W	-19999	45536
15	CODE	Security code for parameter protection	Low: 0 High: 9999	0	R/W	0	65535
16	LOCK	Parameters lock	0 oFF: Lock off 1 oN: Lock on	0	R/W	0	65535
17	O1TY	Output 1 signal type	0 0-20: 0-20 mA 1 4-20: 4-20 mA 2 0-10: 0-10V 3 0-5V: 0-5V 4 1-5V: 1-5V 5 2-10: 2-10V	1	R/W	0	65535
18	ANL1	Output 1 retransmission low value	Low: -19999 High: 45536	-17.8° C (0.0° F)	R/W	-19999	45536
19	ANH1	Output 1 retransmission high value	Low: ANL1+1 High: 45536	37.8° C (100.0° F)	R/W	-19999	45536
20	OTZ1	Output 1 zero adjustment	Low: -1.000 High 1.000	0	R/W	-19999	45536

Modbus Register Address	Parameter Notation	Parameter Description	Range	Default Value	Data Type	Scale Low	Scale High
21	OTS1	Output 1 span adjustment	Low: -1.000 High: 1.000	0	R/W	-19999	45536
22	O2TY	Output 2 signal type	0 0-20: 0-20 mA 1 4-20: 4-20 mA 2 0-10V: 0-10V 3 0-5V: 0-5V 4 1-5V: 1-5V 5 2-10: 2-10V	1	R/W	0	65535
23	ANL2	Output 2 retransmis-sion low value	Low: -19999 High: 45536	-17.8° C (0.0° F)	R/W	-19999	45536
24	ANH2	Output2 retransmis-sion high value	Low: ANL2+1 High: 45536	37.8° C (100.0° F)	R/W	-19999	45536
25	OTZ2	Output 2 zero adjustment	Low: -1.000 High: 1.000	0	R/W	-19999	45536
26	OTS2	Output 2 span adjustment	Low: -1.000 High: 1.000	0	R/W	-19999	45536
27	O3TY	Output 3 signal type	0 0-20: 0-20 mA 1 4-20: 4-20 mA 2 0-10: 0-10V 3 0-5V: 0-5V 4 1-5V: 1-5V 5 2-10: 2-10V	1	R/W	0	65535
28	ANL3	Offset value for low point calibration	Low: -19999 High: 45536	-17.8° C (0.0° F)	R/W	-19999	45536
29	ANH3	Output 3 high point retransmis-sion value	Low: ANL3+1 High: 45536	37.8° C (100.0° F)	R/W	-19999	45536
30	OTZ3	Output 3 zero adjustment	Low: -1.000 High: 1.000	0	R/W	-19999	45536
31	OTS3	Output 3 span adjustment	Low: -1.000 High: 1.000	0	R/W	-19999	45536
32	ADDR	Address assignment of digital communi-cation	Low: 1 High: 255	1	R/W	0	65535
33	BAUD	Baud rate of digital communi-cation	0 2K4: 2.4 Kbits/s 1 4K8: 4.8 Kbits/s 2 9K6: 9.6 Kbits/s 3 14K4: 14.4 Kbits/s 4 19K2: 19.2 Kbits/s 5 28K8: 28.8 Kbits/s 6 38K4: 38.4 Kbits/s 7 57K6: 57.6 Kbits/s 8 115K: 115.2 Kbits/s	6	R/W	0	65535
34	DATA	Data bit count of digital communi-cation	0 7bit: 7 data bits 1 8bit: 8 data bits	1	R/W	0	65535
35	PARI	Parity bit of digital communi-cation	0 EVEN: Even Parity 1 Odd: Odd parity 2 NoNE: No parity bit	2	R/W	0	65535
36	STOP	Stop bit count of digital communi-cation	0 1bit: One stop bit 1 2bit: Two stop bits	1	R/W	0	65535
37	KPAS	Calibration password	Low: 0 High: 9999	0	R/W	0	65535
38	ADLO	mV calibration low coefficient	Low: -1999 High: 1999	-----	R/W	-19999	45536
39	ADHI	mV calibration high coefficient	Low: -1999 High: 1999	-----	R/W	-19999	45536
40	RTDL	RTD calibration low coefficient	Low: -1999 High: 1999	-----	R/W	-19999	45536

Modbus Register Address	Parameter Notation	Parameter Description	Range	Default Value	Data Type	Scale Low	Scale High
41	RTDH	RTD calibration high coefficient	Low: -1999 High: 1999	-----	R/W	-19999	45536
42	CJLO	Cold junction calibration low coefficient	Low: -5.00 High: 40.00	-----	R/W	-19999	45536
43	CJHI	Cold junction calibration high coefficient	Low: -1999 High: 1999	-----	R/W	-19999	45536
44	V1L	V1 calibration low coefficient	Low: -1999 High: 1999	-----	R/W	-19999	45536
45	V1G	V1 calibration high coefficient	Low: -1999 High: 1999	-----	R/W	-19999	45536
46	MA1L	MA1 calibration low coefficient	Low: -1999 High: 1999	-----	R/W	-19999	45536
47	MA1G	MA1 calibration high coefficient	Low: -1999 High: 1999	-----	R/W	-19999	45536
48	CJCT	Cold Junction Temperature	Low: -4000 High: 9000	-----	R	-19999	45536
49	CJCL	Sense voltage during cold junction calibration low	Low: 0 High: 7552	-----	R	0	65535
50	PV	Process value	Low: -19999 High: 45536	-----	R	-19999	45536
51	MV	Manual control function	0 oFF: Manual control off 1 oN: Manual control on	0	R/W	0	65535
52	MV1	Output 1 percentage value	Low: 0.00 High: 100.00	-----	R (R/W, manual)	0	65535
53	MV2	Output 2 percentage value	Low: 0.00 High: 100.00	-----	R (R/W, manual)	0	65535
54	MV3	Output 3 percentage value	Low: 0.00 High: 100.00	-----	R (R/W, manual)	0	65535
55	EROR	Error code	Low: 0 High: 65535	-----	R	0	65535
56	MODE	Operation mode	Low: 0 High: 65535	-----	R	0	65535
57	PROG	Program code	R24: 24. XX	-----	R	0	65535
58	CMND	Command code	Low: 0 High: 65535	-----	R/W	0	65535
59	JOB	Job code	Low: 0 High: 65535	-----	R/W	0	65535
60	OFS1	Option function 1 selection	0 NoNE: No selected 1 R485: RS-485 2 di1: Digital input 1	2	R/W	0	65535
61	OFS2	Option function 2 selection	0 NoNE: No selected 1 REiR: Retransmission output 2 di2: Digital input 2	0	R/W	0	65535

4. TERMINAL CONNECTION



5. PROGRAMMING

During power on the device will show the PV on the upper display and MV on the lower display. Press to enter the setup menu. Use keys to select the desired parameter. Use the key to go back to the home screen. In the set-up menu, the upper display indicates the parameter symbol, and the lower display indicates the value of the selected parameter.

User Security

There are two parameters PASS (password) and CODE (securitycode) which will control the data security function for accessing the setup parameters. If the CODE=PASS then the user can access the setup parameters. If the CODE ≠ PASS then the user can’t access the setup parameters.

There is one more parameter LOCK is available to control the parameter change. If the LOCK is on then the parameters can’t be changed. If the LOCK is OFF then the parameters can be changed.

Calibration Password

The calibration of the device is protected with separate security access. The parameter KPAS value is 3418 then only the user can access the calibration parameters. Otherwise, the calibration parameter can’t be accessed.

Signal Input

INPT: Select the sensor type or signal type for signal input.

Range: (Thermocouple) J_tC, K_tC, T_tC, E_tC, B_tC, R_tC, S_tC, N_tC, L_tC, U_tC, P_tC, C_tC, d_tC(RTD) PT.DN, PT.JS, (Linear) 4-20, 0-20, 0-5V, 1-5V, 0-10.

UNIT: Select the processing unit.

Range: ° C, ° F, PU (Process Unit). If the unit is neither ° C or ° F, then selects PU.

DP: Select the resolution of the process value.

Range: For Thermocouple and RTD signal No.DP, 1-DP and For Linear signal NO. DP, 1-DP, 2-DP, 3-DP.

IN.Lo: Select the low scale value for the linear type input.

IN.Hi: Select the high scale value for the linear type input.

Output Type

The Output type should be selected properly on the output type selection parameter O1TY, O2TY and O3TY Parameters. The option selection in oFS2 needs to select Retransmission to enable output3.

Retransmission

The signal conditioner will output (retransmit) PV on its output terminals of output1, output2 and output3. ANL1 and ANH1 are adjusted to specify the low scale and high scale values of output1 retransmission. Similarly, ANL2, ANL3, ANH2 and ANH3 parameters are adjusted for output2 and output3.

Zero and Span adjustment

The signal conditioner has the option to adjust the zero and span of the outputs to meet the required accuracy. The user can adjust the parameters otZ1, otZ2 and otZ3 to adjust the zero value of the output1, output2 and output3 respectively. The user can adjust the parameters otS1, otS2 and otS3 to adjust the span value of the output1, output2 and output3 respectively. The allowable range for zero and span adjustment is from -1.000 to 1.000.

Square Root function (SQRT)

The square root function (SQRT) function will output the square root value of the PV. The square root function will be enabled by setting the parameter SQRT.

Manual Control

Some application requires to test with the manual output from the signal conditioner. For this, the manual mode can be used. Use keys to access the MANU mode parameters. Use key to navigate to the manual mode control parameter MV. Set MV to ON to start the manual mode output. Use the key to select the desired output parametersMV1, MV2 and MV3. Use the keys to set the required output values. Set MV to OFF to stop the manual output.

Factory Default

The signal conditioner parameters can be loaded with default values listed in the parameter description table. In certain situation it is desirable to retain these values after the values of the parameters have been changed. The below procedure to be followed to reload the default values.

1. Use keys to access the FILE parameters
2. Set PASS = CODE to access other parameters
3. Select the dFLt in File
4. Press and hold for 5 seconds or until the upper display FILE flash for a moment.

The default values of all parameters are loaded now.

RS-485 Setup

- Set ofFS1 to RS485
- Set individual addresses for units connected to the same port.
- Set the Baud Rate (BAUD), Data Bit (DATA), Parity Bit (PARI) and Stop Bit (STOP) such that these values are accordant with PC setup conditions.

Digital Input

One digital Input is available in this signal conditioner. The digital input accepts a digital (on/off) type signal. The digital input can be used via DI1 or DI2.

One of the below functions can be chosen by using DI in the setup menu. The digital input needs to be selected in oFS1 or oFS2 as dI1 or dI2. Only one digital input DI1 or DI2 can be used.

Digital Input Functions

NONE: No digital input function. If chosen, the digital input function is disabled.

MA.Ho: If chosen, the maximum value of PV during the digital input period will be retransmitted. If the PV changes to lower value the output will not change to the lower value. If the PV is changed to a higher value the output value will change.

dA.Ho: If chosen the output will not change for the change in PV. It will keep retransmitting the PV at the rising edge of DI.

ZERo: If chosen, the current PV will become zero for retransmitting.

6. ERROR CODE

Error Code	Display Symbol	Description & Reason	Corrective Action
10	ER10	Communication error: bad function code	Correct the communication software to meet the protocol requirements
11	ER11	Communication error: register address out of range	Do not issue an over-range address of the register to the slave
14	ER14	Communication error: attempt to write a read-only data	Do not write read-only data or protected data to the slave
15	ER15	Communication error: write a value which is out of range to a register	Do not write an over-range data to the slave register
29	EEPR	EEPROM can’t be written correctly	Return to factory for repair
30	CJER	Cold junction compensation for Thermocouple malfunction	Return to factory for repair
39	SBER	Input sensor break, or input current below 1 mA if 4-20 mA is used, or input voltage below 0.25V if 1 - 5V is used	Replace the input sensor
40	AADER	A to D converter or related component(s) malfunction	Return to factory for repair