

Universal Analog Input, Analog Output & Transistor Output Extension Modules

	General Specifications : * 1 piece universal analog input * Analog input types : Cu-50, PT100, PT1000, PTC, NTC, mV, Thermocouple (L, J, K, R, S, T, B, E, N, C,), V, mA * ON/OFF control, PID control, AutoTune, SelfTune * According to module type; 4 or 1 digital output (Active High) * According to module type; 0 or 1 analog output (V/mA) * Modbus RTU communication protocol with RS485 * USB – Device (For device configuration) * Modular connection (up to 16 modules including itself) * Led indicators: - Power Supply, USB, RS-485 - Analog Input error led indicators - Active Output led indicators
SMR1P1-00-30-07-02_1	SMR1P1-00-30-04-00_1

Technical Specifications

Module Type	SMR1P1-00-30-07-02		SMR1P1-00-30-04-00	
Supply Voltage	24 VDC ±%20 (19,2 VDC - 28,8 VDC)			
Power Consumption	1.5W			
Communication	RS-485 Modbus RTU			
USB Device	Mini USB, USB 2.0			
Analog Inputs				
Number of Inputs	1			
Input Sensor Type	TC / Cu-50 / PT-100 / PT-1000 / PTC / NTC / mV / V / mA			
Measurement Range / Resolution	TC (L)*1	-200 ... +800 °C / 0.1 °C	-328 ... +1472 °F / 0.1 °F	
	TC (J)	-200 ... +900 °C / 0.1 °C	-328 ... +1652 °F / 0.1 °F	
	TC (K)	-200 ... +1300 °C / 0.1 °C	-328 ... +2372 °F / 0.1 °F	
	TC (R)	0 +1700 °C / 0.1 °C	32 +3092 °F / 0.1 °F	
	TC (S)	0 +1700 °C / 0.1 °C	32 +3092 °F / 0.1 °F	
	TC (T)	-200 ... +400 °C / 0.1 °C	-328 ... +752 °F / 0.1 °F	
	TC (B)	44 +1800 °C / 0.1 °C	110 +3272 °F / 0.1 °F	
	TC (E)	-150 ... +700 °C / 0.1 °C	-238 ... +1292 °F / 0.1 °F	
	TC (N)	-200 ... +1300 °C / 0.1 °C	-328 ... +2372 °F / 0.1 °F	
	TC (C)	0 +2300 °C / 0.1 °C	32 +4172 °F / 0.1 °F	
	Cu-50	-200 ... +200 °C / 0.1 °C	-328 ... +392 °F / 0.1 °F	
	PT-100	-200 ... +650 °C / 0.1 °C	-328 ... +1202 °F / 0.1 °F	
	PT-1000	-200 ... +650 °C / 0.1 °C	-328 ... +1202 °F / 0.1 °F	
	PTC	-50 +150 °C / 0.1 °C	-58 +302 °F / 0.1 °F	
	NTC	-50 +100 °C / 0.1 °C	-58 +212 °F / 0.1 °F	
	mV	0 +50 mV / 10 µV		
	V	0 +2V / 1 mV		
		0 +5V / 1 mV		
		0 +10V / 1 mV		
		2 +10V / 1 mV		
	mA	0 +20mA / 1 µA		
		4 +20mA / 1 µA		
Note-1 : TC (L) is a GOST R 8.585-2001 type sensor				
ADC resolution	15 bit			
Input Impedance	Voltage type inputs	> 48 KΩ		
	mA type inputs	> 47 Ω		
	Other type inputs	~ 15,4 MΩ		
Overall accuracy	% 0.2 (full scale)			
Response time	160 msec / channel			

Average function	The arithmetic average of the last read measurements according to the specified average number of samples	
Fault detections	1- short circuit, 2- sensor break, 3- over range	
Analog Output		
Number of Outputs	1 x V / mA	-
Output range	0-10V or 0-20mA (only one tpe can be selected in the same time)	
Overall accuracy	% 0.5 (in the full scale measurement range)	
Response time	~200 msec	
Digital Outputs		
Number of Outputs	1 x Active High	4 x Active High
Output Current	0,3 A (one output), 1.2 A (total COM current)	
Transistor Power	External 24VDC supply must be connected	
Response Time	~170 μsn	
Protection	Short circuit protection	
Led Indicators		
Power	Always ON if the power input is in working limits, flashes 0.1s when undervoltage detected Flashes 0.5s if the communication between Master and Slave module didn't start Flashes 1s if the communication between Master and Slave module broken Flashes 0.2s ON / 2s OFF if the device in Software Boot Mode	
USB	Always ON if the USB cable plugged, flashes during data transfer	
RS485	Flashes during Modbus data transfer	
Analog Input	Always OFF in normal operation Always ON in case of fault detection (Sensor Break, Short Circuit, Over Range) Flashes during PID auto-tune or self-tune process ongoing	
Transistor Output	ON when output active, OFF otherwise	
Analog Output	ON when output active, OFF otherwise	
Operation / Storage Environment		
Operation Temp.	-10°...+60° C	
Storage Temp.	-20°...+70° C	
Isolation	* There is no isolation between Power, RS485 and USB * 500 VAC between Analog Input and Power Input * 1000 VAC between Digital Outputs and Power Input * 500 VAC between Analog Output and Power Input	

Modbus Parameters Addresses

Address	R/W	Parameter Name	Definition	Default
Modbus Parameters				
40001	R/W	ID	Modbus ID can be set between 1 – 255	1
40002	R/W	Baud Rate (kbps)	0- 1200 3- 9600 6- 57600 1- 2400 4- 19200 7- 115200 2- 4800 5- 38400	6
40003	R/W	Stop Bit	0- 1 Bit 1- 2 Bit	0
40004	R/W	Parity	0- None 1- Even 2- Odd	0
Device Parameters				
40005	R	Reserved	In case of Master Mode, shows number of connected Slave Modules	-
40006	R	Type/Bus Order	b15-b8 : module types according to code : SMR1P1-00-30-07-02_1 = 0xAF SMR1P1-00-30-04-00_1 = 0xB0 b7-b0 : module bus order : 0- Master module N- N'th Slave module in the bus (max. 15) 17- Single module (No other device on bus)	-

40007	R	Version	HW and SW versions displayed on a bitwise basis b15-b12 : Hardware Version b11-b6 : Software Major Version b5-b0 : Software Minor Version	-
40008	R/W	Error Status ²	Error status displayed on a bitwise basis b0 : Low Power Supply Voltage Level b1 : Analog Input could not read b2 : RS485 communication timeout error ¹ b8 : Error in slave module number ¹ b9 : Error in slave module type ¹ b10 : Error in communication between slave modules ¹ b15-b12 : The number of the Slave module in which the error was detected <i>Note-1 : Error bits are only valid for Master Module.</i> <i>Note-2 : In case of communication timeout error arises in Master Module, communication between slave modules interrupted. By writing 3083 to the relevant address, the error bit cleared and the communication started again.</i>	-
40009	R/W	Timeout Duration	Defined for Master Module Definition Range : (0 – 60sec)	3
Analog Input Parameters				
40011	R/W	Temperature Display Unit	Applies to all Analog Input sensor types except type V or mA. 0- Celcius (°C) 1- Fahrenheit (°F)	0
40012	R/W	AI0 Sensor Type	Sensor type selection : 0- TC-L 6- TC-B 12- PT1000 18- 0-10V 1- TC-J 7- TC-E 13- PTC 19- 2-10V 2- TC-K 8- TC-N 14- NTC 20- 0-20mA 3- TC-R 9- TC-C 15- mV 21- 4-20mA 4- TC-S 10- Cu-50 16- 0-2V 5- TC-T 11- PT100 17- 0-5V	0
40014	R/W	AI0 Sensor Offset Value	Depending on the sensor type, values up to ± %10 of measuring range can be entered. For dotted types, the value must be entered as x10	0
40015	R/W	AI0 Average Sample Number	Number of last sample readings in Analog Input for average input value calculation. Value can be set between (1 – 20)	4
40016	R	AI0 Average Value	Average analog input value	-
40017	R	AI0 Present Value	Present analog input value	-
40018	R	AI0 Errors	Stores error status in the relevant input in bitwise form b0 : Sensor Break, Value : 32767 b1 : Short Circuit, Value: 32766 b2 : Over Sample, Value: 32765	-
40019	R	Ambient Temperature	Ambient Temperature of the module	-
ON-OFF / PID Kontrol Parametreleri				
40041	R/W	Control Type	0- Passive (In case of this situation, related relay can be controlled manually) 1- PID Mode Active 2- ON-OFF Mode Active 3- PWM Mode Active	0
40042	R/W	Set Value	Can be set between (MinScale – MaxScale) values. For dotted type, value can be set as x10	0
40043	R/W	Set Offset	Can be set between (-MaxScale/2 – MaxScale/2) values. For dotted type, value can be set as x10	0

40044	R/W	Hysteresis	Used in ON-OFF mode, can be set between (0 – (MaxScale – MinScale)/2) values. For dotted type, value can be set as x10	0
40045	R/W	Minimum Scale	Can be set between (MinMeasRange – MaxScale) values. For dotted type, value can be set as x10	Min Meas. Range
40046	R/W	Maximum Scale	Can be set between (MinScale – MaxMeasRange) values. For dotted type, value can be set as x10	Max Meas. Range
40047	R/W	Heating Proportio.	Can take values between (0 – 1000)	100
40048	R/W	Heating Integral	Can take values between (0 – 3600)	100
40049	R/W	Heating Derivative	Can take values between (0 – 1000)	250
40050	R/W	Cooling Proportio.	Can take values between (0 – 1000)	100
40051	R/W	Cooling Integral	Can take values between (0 – 3600)	100
40052	R/W	Cooling Derivative	Can take values between (0 – 9999)	250
40053	R/W	Output period	Can take values between (1 – 150s)	1
40054	R/W	Heating/Cooling	0- Heating 1- Cooling	0
40055	R/W	Configuration	b0 : PID 0- Stop / 1- Run b1 : Auto Tune 0- Off / 1- On b2 : Self Tune 0- Off / 1- On	0 0 0
40056	R/W	PID Instant Output Value %	Shows PID % output. In case of PWM selected as Control Type, this value used as % output value.	-
40057	R/W	Errors	Shows Relevant Errors	-
Digital Output Parameters				
40063	R/W	Digital Outputs	Digital Output Status in bitwise notation b3-b0 : Q3 - Q0 (0 : OFF, 1 : ON)	0
Analog Output Parameters				
40064	R/W	Analog Output Configuration	b0 : type selection (0- V / 1- mA) b2-b1 : source selection (00- value written in register 40065 used / 01- analog input value scaled with 40066 and 40067 used / 10- PID instantaneous % output value in 40056 is used)	0 00
40065	R/W	Analog Output	<i>Look at Analog Output Application Examples</i>	0
40066	R/W	Minimum Scale Value for Input	Can be set between (MinMeasRange -MaxInputScale)	Min Meas. Range
40067	R/W	Maximum Scale Value for Input	Can be set between (MinInputScale -MaxMeasRange)	Max Meas. Range
40068	R/W	Minimum Scale Value for Output	Can be set between (MinOutputRange – MaxOutputScale)	Min Output Range
40069	R/W	Maximum Scale Value for Output	Can be set between (MinOutputScale – MaxOutputRange)	Max Output Range

Analog Output Application Example – 1

To create analog output in the range (0-10V) by writing to the 40065 modbus address;

- 40064.b0 = 0 (V is selected as analog output type)
- 40064.b2-b1 = 00 (value written in 40064 used as analog output source)
- 40068 = 0 (default minimum analog scale (0V/0mV))
- 40069 = 10000 (default maximum analog scale (10V/10000mV))

Thus, when 0 written to address 40065 analog voltage 0V, when 10000 written to address 40065 analog voltage 10000mV (10V), when a value between 0 and 10000 written analog output is calculated and created linearly between 0 and 10V.

Analog Output Application Example – 2

To convert analog input in the range (2-5V) to analog output in the range (4-20mA);

- 40012 = 18 (0-10V selected as analog sensor type)
- 40064.b0 = 1 (mA type selected as output sensor type)
- 40064.b2-b1 = 01 (uses analog input value scaled with 40066 and 40067 as analog output source)
- 40066 = 2000 (Minimum analog input scale value set to 2V / 2000mV)
- 40067 = 5000 (Maximum analog input scale value set to 5V / 5000mV)
- 40068 = 4000 (Minimum analog output scale value set to 4mA / 4000μA)
- 40069 = 20000 (Maximum analog output scale value set to 20mA / 20000μA)

Thus, when the analog input is 2V or below, the analog output set to 4mA, when the analog input is 5V or above, the analog output set to 20mA. When the analog input is between 2V and 5V, the analog output set to linearly calculated value between 4mA and 20mA.

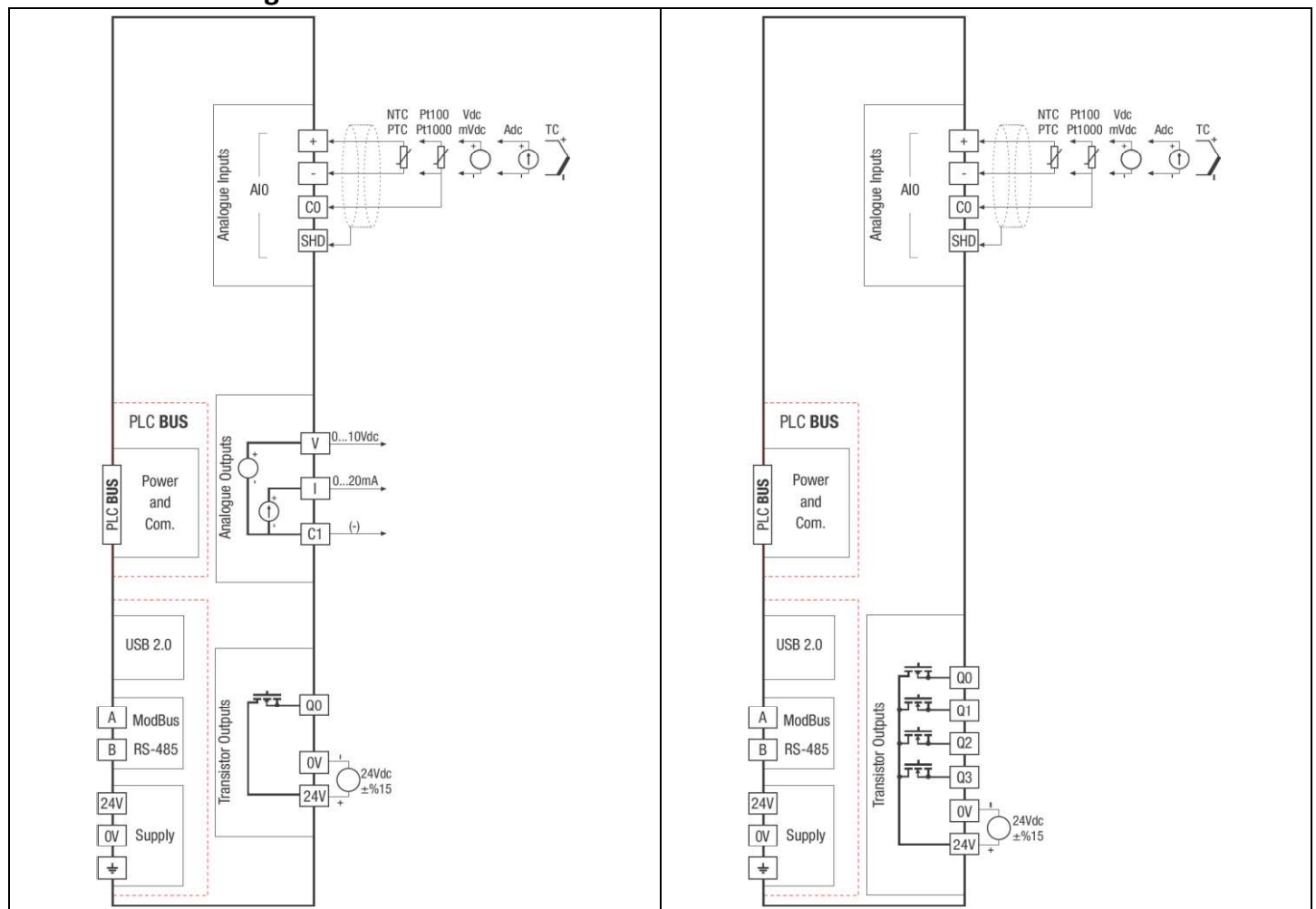
Analog Output Application Example – 3

To convert the PID output of PT-100 sensor input to (0-2V) analog output;

- 40012 = 11 (select PT-100 [-200.0 - 650°C] as the analog input type)
- 40064.b0 = 0 (select V as the analog output type)
- 40064.b2-b1 = 10 (use the PID instantaneous % output value from 40056 as the analog output source)
- 40068 = 0 (set the analog output minimum scale value to 0V/0mV)
- 40069 = 2000 (set the analog output maximum scale value to 2V/2000mV)

Thus, 0V analog output set for 0% PID output, 2V analog output set for 100% PID output, and between 0% to 100% PID output, analog output calculated and set linearly between 0V and 2V.

Installation & Wiring

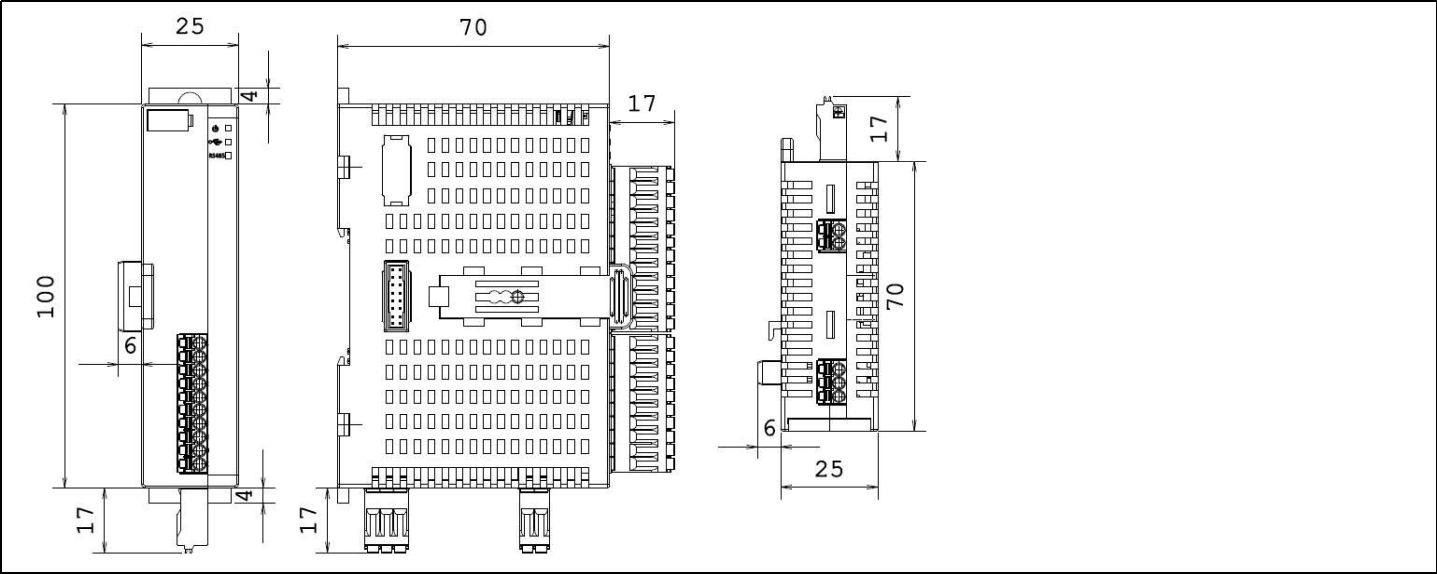


* Do not connect AC Power to any I/O terminal, otherwise serious damage may occur in module. Please check all wiring prior to energizing device. In order to prevent electromagnetic interference, be sure the grounding made corrected. Connect ground terminal in the power input connector to the overall system ground. Don't touch any terminals after energizing the device, in case of need to touch any terminal, de-energize the device before connection.

* For analog input connections; use original cable of sensors. In order to avoid noise interference, keep sensor cables away from power cables. 3-wire RTD sensor provides line resistance compensation. 2-wire RTD sensor has no line resistance compensation. In order not to be affected from electromagnetic interference, sensor shield cables must be connected to SHD pins and SHD pin must be grounded to system earth.

* For RS485 communication connection; Connect the termination resistor (120R) between A&B terminal of the master module (located at the far left of the extension module group). In case of more than one extension module group, connect it between the A&B terminals of the master module (located at the far left of the extension module group) of the group at the end of the communication line. Use shielded and twisted-pair communication cable. Ground the shield connection of the cable to power input earth terminal.

Dimensions



Product Order Codes

Extension Modules with Analog Inputs	Digital Input	Analog Input	Digital Output	Analog Output	USB	RS 485
SMR1P1-00-30-07-02_1	-	1 x TC/PT100/PT1000/PTC/NTC/mV/V/mA	1 x Transistor	1 x V/mA	+	+
SMR1P1-00-30-04-00_1	-	1 x TC/PT100/PT1000/PTC/NTC/mV/V/mA	4 x Transistor	-	+	+