OPERATIONAL MANUAL

TEMPERATURE SCANNER

[Sixteen Channel]

MODEL : MAX-16X

TEMPERATURE SCANNER

MODEL: MAX–16X

DESCRIPTION

The ASHE MAX-16X is a fully configurable micro-controller based Temperature Scanner with control outputs, offered in a highly compact, rugged and reliable execution. The instrument has six keys on the front panel, with which the operator can set the parameters and configure the instrument as desired. A two-digit red LED display named CHANNEL indicates the channel number, while a four-digit red LED display indicates the corresponding TEMPERATURE value.

The instrument has non-volatile memory (i.e., in case of power failure, the set points and other instrument settings are retained in memory and the indication and control actions resume after power is restored). The instrument accepts input from four nos. three-wire RTD Pt-100 or thermocouples like J type, K type, R type, S type, N type, B type, and T type. The instrument is calibrated as specified.

The MAX-16X provides one control Relay output for each channels, providing alarm or trip set-points for any channel. The set points are configured through the Membrane Keypad on the front panel [see *CONFIGURATION AND SETTINGS* section]. The instrument operates on 90 to 270 V, 50/60 Hz Universal AC power supply and is offered in ¼ DIN standard panel-mount executions.

The instrument has a Modbus output. The communication between instrument and computer can be done by using RS-485 to USB (not in our scope).

The temperature operating range is factory calibrated to the desired operating range of the input sensor through the instrument software and may be changed, if specifically required. The input signal is suitably isolated and conditioned by the micro-controller, which displays the actual process value in real time on the digital display.

Other features include its inherent accuracy and immunity to shocks, dust, ambient temperatures, and humidity. It is also available in field-mounting (weather-proof / explosion-proof executions) and standard panel mounting enclosures.

Further, the instrument is manufactured using selected high-grade components which guarantee its functionality and long operational life. The instrument carries a performance warranty against manufacturing defects and workmanship defects (see *WARRANTY* clause).

INSTALLATION

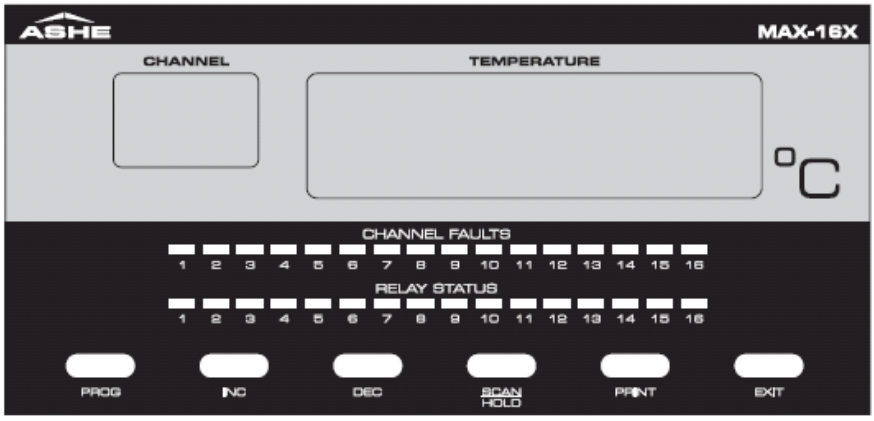
The instrument should be first mounted in an appropriate cut-out on the panel [See *TECHNICAL SPECIFICATIONS*]. All interconnections to the instrument should be made with strong multi-strand wire of the order of 1 sq.mm. The ends of the wires should be properly ferruled and suitable lugs must be used for effective termination.

The cables carrying the input sensor signals should be routed separately and properly isolated from the power line cables, to prevent any electromagnetic interference in the input signal readings from the mains power line. Use of shielded twisted pair cable is recommended for input signals. The shield must be connected to Earth only at the instrument end.

The instrument should be earthed to a proper grounding point before connecting the Power Supply. The voltage between the Earth and Neutral terminals should be negligible (Approx. 1 V AC). The Relay contacts are potential free and any desired voltage may be used in conjunction with the same.

OPERATION & SETTINGS

The front panel of the Temperature Scanner is as shown below:



The Temperature Scanner has two display windows on the front panel - a four-digit display indicating the temperature value and another two-digit display for indicating the channel number.

Red LED indications show the status of the all control Relays. Also, sixteen yellow LED indications show the channel faults and alarm conditions.

CONTROL KEYS

The instrument has six keys on the front panel, functions of which are described below

PROG ◇	The PROGRAM key is the central co-coordinating key for accessing the settings of the instrument. Pressing this Key, one can sequentially view, change and save the parameters such as Relay Set-points for control action for each Relay, Channel Skip, Scan Time, RTC, Input Correction, etc.
INC ⇧	The INC or Incrementing key allows the operator to select the numeral in the digit being set. The digit will sequentially display 0, 1, 2….9 on each pressing of the INC key. This may be used to set the Set-points of the Relays and other selections.
DEC ⇩	The DEC or Decrementing key allows the operator to select the numeral in the digit being set. The digit will sequentially display 9, 8, 7….0 on each pressing of the DEC key. This may be used to set the Set-points of the Relays and other selections.
SCAN / HOLD	The SCAN/HOLD key allows the operator to shift from "Scan" to "Hold" mode. In SCAN mode all selected channels are scanned one after another. In HOLD mode the Scanner will hold the selected channel/s & other channels can be viewed by using the INC or DEC keys. The 'HOLD' mode is shown by the channel display alternately blinking the characters 'CH' and then the channel number. This key is also used to save the "Calibration" as well as parameter settings.
PRINT	Not applicable for this unit.
EXIT	The EXIT key allows the operator to exit directly from any setting mode. e.g.: Suppose the Operator is setting alarm values. After setting Alarm-1 & Alarm-2, if he would like to exit the menu without disturbing other settings, then by pressing EXIT key he can "escape" out from Setting mode to Normal mode.

CONTFIGURATION & SETTINGS

Note: All parameters to be change / select using PROG, INC and DEC keys.

MENU

KEY PRESSED	CHANNEL DISPLAY	TEMPERATURE DISPLAY	FUNCTION
Press INC & DEC	--	rnGE	Range setting mode
INC	--	SKIP	Channel Skip mode for all channels
INC	--	tIME	Time setting
INC	--	IPC	Input error correction mode for all channels
INC	--	SEnS	Sensors selections mode for all channels
INC	--	rtC	Real time chock setting mode
INC	--	FUnC	Device Id selection mode
INC	--	ALrn	Alarm and trip setting mode for all channels.
INC	--	rELy	Relay setting mode for all channels.
INC	--	CUr	Not Applicable
INC	--	CAL	Not Applicable
EXIT	01	100.0	Process Value as per connected input sensor.

Press INC key to select parameter.

RANGE SETTING

- Use INC & DEC keys to change value of the desired parameter.
- Use PROG key to move to next parameter.
- Use **SCAN/HOLD** key to **save** desired value of the parameter.

KEY PRESSED	CHANNEL DISPLAY		TEMPERATURE DISPLAY	FUNCTION
	MAIN DISPLAY	ALTERNATE DISPLAY		
INC + DEC	--		rnGE	Range setting mode
PROG **P**	PS		0000	Select desired password by INC & Dec keys & press PROG key. If password is correct then it will enter into corresponding setting menu. Or if password is incorrect then it will exit to main screen. **(Password = 2)**
PROG **P**	dP	01	[User Setting]	Not Applicable
PROG **P**	rL	01	0000	**RANGE LOW setting**: The desired Zero (lower) range for the process being measured may be set using ↑ and ↓ keys. The lower limits for individual inputs are : **rtd 1** -099°C **rtd.1** -99.9°C **tC– J, ├,r, S, n, b ,t** 0000°C

PROG **P**	rH	01	0500	**RANGE HIGH setting:** The desired Span (higher) range setting for the process being measured may be set using ↑ and ↓ keys. The higher limits for individual inputs are : **Γtd 1** 0500°C **Γtd.1** 500.0°C **tC– t** 0400°C **tC– J** 0750°C **tC– ├ ,n** 1200°C **tC– S, Γ** 1750° **tC– b** 1820°C
Note: The same process is applicable for all sixteen channels.				

CHANNEL SKIP SETTING

- Use INC & DEC keys to change value of the desired parameter.
- Use PROG key to move to next parameter.
- Use **SCAN/HOLD** key to **save** desired value of the parameter.

KEY PRESSED	CHANNEL DISPLAY		TEMPERATURE DISPLAY	FUNCTION
	MAIN DISPLAY	ALTERNATE DISPLAY		
INC + DEC	--		SKIP	**Channel Skip** mode for all channels
PROG **P**	PS		0000	Select desired password by INC & Dec keys & press PROG key. If password is correct then it will enter into corresponding setting menu. Or if password is incorrect then it will exit to main screen. **(Password =8)**
PROG **P**	CH	01	On	Operator can skip a channel by using INC and DEC key. Operator can select ON or SKIP option.
PROG **P**	CH	02	SKIP	Operator can skip a channel by using INC and DEC key. Operator can select ON or SKIP option. If select "SKIP" then particular channel will be disable.
Note: The same process is applicable for all sixteen channels.				

TIME SETTING

- Use INC & DEC keys to change value of the desired parameter.
- Use PROG key to move to next parameter.
- Use **SCAN/HOLD** key to **save** desired value of the parameter.

KEY PRESSED	CHANNEL DISPLAY		TEMPERATURE DISPLAY	FUNCTION
	MAIN DISPLAY	ALTERNATE DISPLAY		
INC + DEC	--		tIME	**Time setting**
PROG **P**	PS		0000	Select desired password by INC & Dec keys & press PROG key. If password is correct then it will enter into corresponding setting menu. Or if password is incorrect then it will exit to main screen**. (Password = 2)**
PROG **P**	St	--	0001	Operator can set scan time by using INC and DEC key from 0000 to 0240.Scan time is in seconds.

PROG **P**	LG	--	0001	Operator can set the data logging time by using INC and DEC key from 0000 to 0240 or OFF. The log time is in seconds.

INPUT CORRECTION SETTING

- Use INC & DEC keys to change value of the desired parameter.
- Use PROG key to move to next parameter.
- Use **SCAN/HOLD** key to **save** desired value of the parameter.

KEY PRESSED	CHANNEL DISPLAY		TEMPERATURE DISPLAY	FUNCTION
	MAIN DISPLAY	ALTERNATE DISPLAY		
INC + DEC	--		IPC	**Input error correction** mode for all channels
PROG **P**	PS		0000	Select desired password by INC & Dec keys & press PROG key. If password is correct then it will enter into corresponding setting menu. Or if password is incorrect then it will exit to main screen. (**Password = 2**)
PROG **P**	oF	01	0000	Operator can adjust the display reading of channel 1 by setting appropriate counts using INC and DEC keys from -100 to 100. e.g. If actual temp. is 25 deg. And display is showing 24 then set IPC "1"
PROG **P**	oF	02	0000	Operator can adjust the display reading of channel 2 by setting appropriate counts using INC and DEC keys from -100 to 100.
Note: The same process is applicable for all sixteen channels.				

SENSOR SELECTION SETTING

- Use INC & DEC keys to change value of the desired parameter.
- Use PROG key to move to next parameter.
- Use **SCAN/HOLD** key to **save** desired value of the parameter.

KEY PRESSED	CHANNEL DISPLAY		TEMPERATURE DISPLAY	FUNCTION
	MAIN DISPLAY	ALTERNATE DISPLAY		
INC + DEC	--		SEnS	**Sensor selection** mode for all channels
PROG **P**	PS		0000	Select desired password by INC & Dec keys & press PROG key. If password is correct then it will enter into corresponding setting menu. Or if password is incorrect then it will exit to main screen. **(Password = 2)**
PROG **P**	Sn	01	rtd.1	Operator can set the desired sensor type by using INC & Dec keys. Default sensor type is RTD (rtd.1) **Options are:** Rtd,rtd.1,J,k,r,s,t,b,n.

PROG **P**	Sn	02	rtd.1	Operator can set the desired sensor type by using INC & Dec keys. Default sensor type is RTD (rtd.1)
Note: The same process is applicable for all sixteen channels.				

RTC (REAL TIME CLOCK) SETTING

- Use INC & DEC keys to change value of the desired parameter.
- Use PROG key to move to next parameter.
- Use **SCAN/HOLD** key to **save** desired value of the parameter.

KEY PRESSED	CHANNEL DISPLAY		TEMPERATURE DISPLAY	FUNCTION
	MAIN DISPLAY	ALTERNATE DISPLAY		
INC + DEC	--		rtC	**Real Time Clock** setting mode
PROG **P**	PS		0000	Select desired password by INC & Dec keys & press PROG key. If password is correct then it will enter into corresponding setting menu. Or if password is incorrect then it will exit to main screen. **(Password = 2)**
PROG **P**	Hr	--	0012	Operator can set hours by using INC and DEC key from 0000 to 0023.
PROG **P**		--	0005	Operator can set minutes by using INC and DEC key from 0000 to 0059.
PROG **P**	dt	--	0010	Operator can set date by using INC and DEC key from 0000 to 0031.
PROG **P**		--	0005	Operator can set month by using INC and DEC key from 0000 to 0012.
PROG **P**	yr	--	2020	Operator can set year by using INC and DEC key from 2000 to 2099.

FUnC SETTING (SCANNER ID AND LOG SETTING)

- Use INC & DEC keys to change value of the desired parameter.
- Use PROG key to move to next parameter.
- Use **SCAN/HOLD** key to **save** desired value of the parameter.

KEY PRESSED	CHANNEL DISPLAY		TEMPERATURE DISPLAY	FUNCTION
	MAIN DISPLAY	ALTERNATE DISPLAY		
INC + DEC	--		FUnC	Device Id selection mode & Log setting
PROG **P**	PS		0000	Select desired password by INC & Dec keys & press PROG key. If password is correct then it will enter into corresponding setting menu. Or if password is incorrect then it will exit to main screen**. (Password = 2)**
PROG **P**	PL	--	0120	Present log
PROG **P**		--	2000	Instrument can save 2000 Maximum log.
PROG **P**	CL	--	no	Clear Log. Use INC/DEC key to select Yes or no. If select Yes then all present log data will be erase.

PROG **P**	Id	--	0000	This is the instrument's Modbus Id. Suppose multiple scanners are connected in the Modbus loop, the each instrument should have different Modbus Id. Operator can set the this id using INC and DEC key from 0001 to 0099.

ALARM & TRIP SETTING

- Use INC & DEC keys to change value of the desired parameter.
- Use PROG key to move to next parameter.
- Use **SCAN/HOLD** key to **save** desired value of the parameter.

KEY PRESSED	CHANNEL DISPLAY		TEMPERATURE DISPLAY	FUNCTION
	MAIN DISPLAY	ALTERNATE DISPLAY		
INC + DEC	--		ALrn	**Low Alarm and High Alarm setting** mode for all channels.
PROG **P**	PS		0000	Select desired password by INC & Dec keys & press PROG key. If password is correct then it will enter into corresponding setting menu. Or if password is incorrect then it will exit to main screen. (Password = 2)
PROG **P**	Lo	01	0000	**Low Alarm set point for Channel 1**. It can be set using INC or DEC keys.
PROG **P**	Hy	01	0002	**Hysteresis** for **Channel 1 Low Alarm.** It can be set using INC or DEC keys from 0002 to 0100.
PROG **P**	HI	01	0200	**High Alarm set point for Channel 1**. It can be set using INC or DEC keys.
PROG **P**	Hy	01	0002	**Hysteresis** for **Channel 1 High Alarm**. It can be set using INC or DEC keys from 0002 to 0100.
Note: The same process is applicable for all sixteen channels.				

RELAY SETTING

- Use INC & DEC keys to change value of the desired parameter.
- Use PROG key to move to next parameter.
- Use **SCAN/HOLD** key to **save** desired value of the parameter.
-

KEY PRESSED	CHANNEL DISPLAY		TEMPERATURE DISPLAY	FUNCTION
	MAIN DISPLAY	ALTERNATE DISPLAY		
INC + DEC	--		rELy	**Relay setting** mode
PROG **P**	PS		0000	Select desired password by INC & Dec keys & press PROG key. If password is correct then it will enter into corresponding setting menu. Or if password is incorrect then it will exit to main screen. **(Password = 2)**

PROG **P**	rL	01	[User Setting]	In this setting mode, operator can assign particular channel from CH-1 to CH-16 for desired low **alarm set point (Lo 01 to Lo 04)** or **high alarm set point (HI 01 to HI 04)** to control relay 1. If operator does not want to use control relay 1 then he can choose **OFF** function. If operator wants to use control relay 1 for all channels then he can choose **ALL** function.
PROG **P**	rL	02	[User Setting]	In this setting mode, operator can assign particular channel from CH-1 to CH-16 for desired low **alarm set point (Lo 01 to Lo 04)** or **high alarm set point (HI 01 to HI 04)** to control relay 2. If operator does not want to use control relay 2 then he can choose **OFF** function. If operator wants to use control relay 2 for all channels then he can choose **ALL** function.
Note: The same process is applicable for all sixteen channels.				

Alarm Logic:

Low Alarm:

When the process value is **below the set point**, the corresponding Relay gets energized. As the process value crosses the set-point, the Relay gets de-energized.

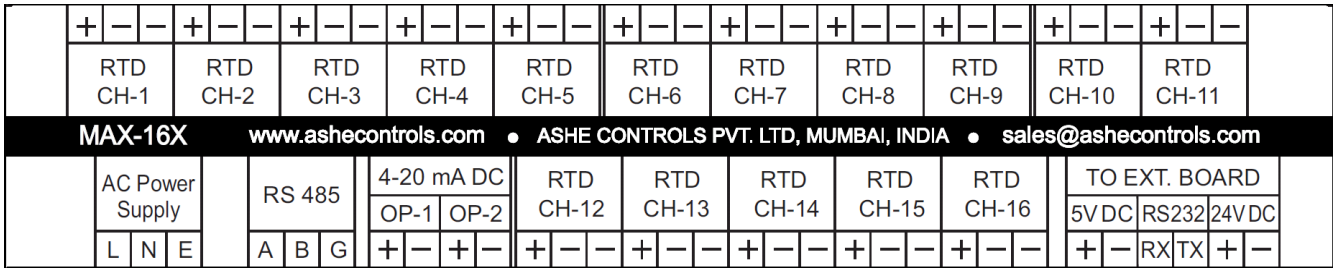
e.g. Suppose low alarm (Lo 01) of channel 1 is 20 & relay 1 (rL 01) is assigned for channel 1 then below 20°C relay-1 will get energize & above 20°C relay-1 will get de-energize with corresponding LED indication.

High Alarm:

When the process value is **above the set point**, the corresponding Relay gets energized. As the process value goes below the set-point, the Relay gets de-energized.

e.g. Suppose high alarm (HI 01) of channel 1 is 50, relay 1 (rL 01) is assigned for channel 1 then above 50°C relay gets energize & below 50°C relay gets de-energize with corresponding LED indication.

TERMINAL DETAILS OF MAIN UNIT



TERMINAL DETAILS OF RELAY CARD (EXT. BOARD)

	NO C NC	NO C NC	NO C NC	NO C NC	NO C NC	NO C NC	NO C NC	NO C NC
	Relay-01	Relay-02	Relay-03	Relay-04	Relay-05	Relay-06	Relay-07	Relay-08
FROM MAIN SCANNER								
+ - RX TX + -	NO C NC	NO C NC	NO C NC	NO C NC	NO C NC	NO C NC	NO C NC	NO C NC
5 VDC RS 232 24 VDC	Relay-16	Relay-15	Relay-14	Relay-13	Relay-12	Relay-11	Relay-10	Relay-09

TECHNICAL SPECIFICATIONS

Model	:	MAX–16X
Type	:	Digital Temperature Scanner
Input Signal	:	RTD Pt-100 /Thermocouple, (J/K/R/S/T/B/n)
No. of Channels	:	16 Nos.
Display	:	Seven-segment, red LED display.
Indications	:	Four-digit display for temperature Two- digit display for channel number.
LED Indications	:	Sixteen Yellow LEDs for channel status Sixteen Red LEDs for Relay status
Scale Range	:	-100.0 to 500.0 for RTD Pt-100 (three-wire), 0 to 400 (t-Type Thermocouple), 0 to 750 (J-Type Thermocouple), 0 to 1200 (K-Type & N-Type Thermocouple), 0 to 1750 (S-Type & R-Type Thermocouple), 0 to 1820 (b-Type Thermocouple),
Response time	:	Typically 100 mS.
Output	:	One control relay single c/o contacts for each Channel.
Contact rating	:	10 Ampere @ 230 V AC (Res. Loads).
Communication	:	RS-485 Output with Modbus RTU protocol.
Memory	:	Non-Volatile (on EEPROM).
Settings	:	By Membrane Keypad on the front panel.
Features	:	Scale calibration, Alarm/Trip, Channel Faults, Channel Skip, Scan/Hold
Accuracy	:	± 1% FS.
Power Supply	:	90 to 270VAC, 50 Hz AC power.
Enclosure	:	Panel mounting.
Dimensions	:	160 X 80 X 150 mm
Cutout	:	151 X 75 mm
Weight	:	Approximately 1.0 kgs.

.....oooOooo.....