3TX-REL Analog Input Configuration Guide

The 3TX-REL is a versatile alarm & relay controller module with 2 independent limits with tight integration with 3TX-pH, 3TX-HiQ-pH, 3TX-ISE(-kilo), 3TX-DO, 3TX-CON & 3TX-TOT modules. This allows for very simple setup with available ranges & scaling limits built into REL. Very tight integration also allows for display & scaling in native units for each measurment; pH, ORP in mV, TOT/ISE in ppm, dissolved oxygen (DO) in ppm or %Saturation, Conductivity in µS/cm or mS/cm. Revision R10 or higher of 3TX-REL supports the intelligent 3TX-HiQ-pH for smart digitial pH & ORP sensors.

Configuration of Analog pH or ORP Input Signals from 3TX-pH, 3TX-pH-X, 3TX-pHE Transmitters

P03 Mode On 3TX-pH	P09 Mode: Only valid when Set to P03=ORP/mV	P06 Setting on 3TX-REL	P09 Minimum Limit on 3TX-REL 4mA low setpoint	P10 Maximum Limit on 3TX-REL 20mA high setpoint	Min Scaling between P09 & P10 on REL
pH	N/A	**pH**	0.00 pH **Match P13 on 3TX-pH**	14.00 pH **Match P14 on 3TX-pH**	1.00pH
ORP	Neg	**ORP**	-1000 mV	0 mV	*Not adjustable for 3TX-pH type*
ORP	Pos	**ORP**	0 mV	+1000 mV	*Not adjustable for 3TX-pH type*
ORP	Ful	**ORP**	-1000 mV	+1000 mV	*Not adjustable for 3TX-pH type*

- NOTE 1: When P06 set to "ORP" on the REL, the P09 on REL default is -1,000mV the P10 default on REL is +1,000mV. Adjust the P09 and P10 settings on the REL to agree with the fixed output scaling of P09 mode selected on the mating 3TX-pH module.
- NOTE 2: **Negative ORP numbers are shown as flashing.** MODbus and analog scaling may differ and are altogether decoupled.
- NOTE 3: The 3TX-pHE lower 4mA scaling limit is -2.00pH and the upper 20mA scaling limit is +16.00pH. To use REL module when either 4mA setpoint (P13) is below 0.00pH and/or 20mA setpoint (P14) is above 14.00pH on 3TX-pHE you must operate with P06 set to the generic % input mode. An example is shown below for illustration purposes:
  - If P13 is +11.00pH & P14 is +15.00pH and REL has P06 set to generic % input mode then +11.00pH shows as 0.00%, +12.00pH shows as 25.0%, +13.00pH shows as 50.0%, +14.00pH shows as 75.0% and +15.00pH shows as 99.9%

Configuration of Analog pH or ORP Input Signals from 3TX-HiQ-pH Transmitters

Type of Digital Sensor Connected	P09 Mode on 3TX-HiQ: Only valid if Sensor type is ORP	P06 Setting on 3TX-REL	P09 Minimum Limit on 3TX-REL 4mA low setpoint	P10 Maximum Limit on 3TX-REL 20mA high setpoint	Min Scaling between P09 & P10 on REL
pH	N/A	**pH**	0.00 pH **Match P13 on HiQ**	14.00 pH **Match P14 on HiQ**	1.00pH
ORP	Neg	**ORP**	-1000 mV **Match P24 on HiQ**	0 mV **Match P25 on HiQ**	100mV
ORP	Pos	**ORP**	0 mV **Match P24 on HiQ**	+1000 mV **Match P25 on HiQ**	100mV
ORP	Ful	**ORP**	-1000 mV **Match P24 on HiQ**	+1000 mV **Match P25 on HiQ**	100mV

- NOTE 1: When P06 is "ORP" on REL, the P09 default is -1,000mV the P10 default is +1,000mV. Adjust the P09 and P10 settings on the 3TX-REL to match the P24 (4mA ORP output setpoint) and the P25 (20mA ORP output setpoint) on mating 3TX-HiQ-pH.
- NOTE 2: **Negative ORP numbers are shown as flashing.** MODbus and analog scaling may differ and are altogether decoupled.
- NOTE 3: The 3TX-HiQ-pH lower 4mA scaling limit is -2.00pH and the upper 20mA scaling limit is +16.00pH. To use REL module when either 4mA setpoint (P13) is below 0.00pH and/or 20mA setpoint (P14) is above 14.00pH on 3TX-HiQ-pH you must operate with P06 set to the generic % input mode. An example is shown below for illustration purposes:
  - If P13 is -1.00pH & P14 is +3.00pH and REL has P06 set to generic % input mode then -1.00pH shows as 0.00%, 0.00pH shows as 25.0%, 1.00pH shows as 50.0%, 2.00pH shows as 75.0% and 3.00pH shows as 99.9%

Configuration of Analog Conductivity Input Signals from 3TX-CON Type Transmitters

Nominal Cell & 3TX-CON Module Type	P06 Setting on 3TX-REL	P08 Setting for Cell on 3TX-REL	P09 Minimum Limit on 3TX-REL 4mA low setpoint	P10 Maximum Limit on 3TX-REL 20mA high setpoint	Min Scaling between P09 & P10 on REL
K=0.01/cm 3TX-CON-L	**CON**	**L.01**	0 µS/cm **Match P11 on 3TX-CON**	20 µS/cm **Match P12 on 3TX-CON**	5 µS/cm
K=0.01/cm 3TX-CON(-E)	**CON**	**0.01**	0 µS/cm **Match P11 on 3TX-CON(-E)**	500 µS/cm **Match P12 on 3TX-CON(-E)**	50 µS/cm
K=0.02/cm 3TX-CON-E	**CON**	**0.02**	0 µS/cm **Match P11 on 3TX-CON-E**	2,000 µS/cm **Match P12 on 3TX-CON-E**	200 µS/cm
K=0.1/cm CON-L	**CON**	**L0.1**	0 µS/cm **Match P11 on 3TX-CON-L**	200 µS/cm **Match P12 on 3TX-CON-L**	50 µS/cm
K=0.1/cm 3TX-CON(-E)	**CON**	**0.1**	0 µS/cm **Match P11 on 3TX-CON(-E)**	5,000 µS/cm **Match P12 on 3TX-CON(-E)**	500 µS/cm
K=0.2/cm 3TX-CON	**CON**	**0.2**	0 µS/cm **Match P11 on 3TX-CON**	10,000 µS/cm **Match P12 on 3TX-CON**	1,000 µS/cm
K=0.2/cm 3TX-CON(-E)	**CON**	**0.2H**	0 µS/cm **Match P11 on 3TX-CON(-E)**	20,000 µS/cm **Match P12 on 3TX-CON(-E)**	2,000 µS/cm
K=1.0/cm CON-L	**CON**	**L1.0**	0 µS/cm **Match P11 on 3TX-CON**	2,000 µS/cm **Match P12 on 3TX-CON**	500 µS/cm
K=1.0/cm 3TX-CON(-E)	**CON**	**1.0**	0 µS/cm **Match P11 on 3TX-CON(-E)**	50,000 µS/cm **Match P12 on 3TX-CON(-E)**	5,000 µS/cm
K=2.0/cm 3TX-CON	**CON**	**2.0**	0 µS/cm **Match P11 on 3TX-CON**	100,000 µS/cm **Match P12 on 3TX-CON**	10,000 µS/cm
K=2.0/cm 3TX-CON(-E)	**CON**	**2.0H**	0 µS/cm **Match P11 on 3TX-CON(-E)**	200,000 µS/cm **Match P12 on 3TX-CON(-E)**	20,000 µS/cm
K=10.0/cm 3TX-CON(-E)	**CON**	**10.0**	0 µS/cm **Match P11 on 3TX-CON(-E)**	500,000 µS/cm **Match P12 on 3TX-CON(-E)**	50,000 µS/cm
K=20.0/cm 3TX-CON(-E)	**CON**	**20.0**	0 µS/cm **Match P11 on 3TX-CON(-E)**	1,000,000 µS/cm **Match P12 on 3TX-CON(-E)**	100,000 µS/cm

NOTE FOR ANALOG vs. MODBUS SCALING FOR CONDUCTIVITY TRANSMITTERS:
Analog output scaling based upon P11 & P12 may differ from MODBUS output scaling the 3TX-CON-E type of transmitters. The analog & MODBUS output scaling will MATCH for the 3TX-CON and 3TX-CON-L type of transmitters

Configuration of Analog Free ISE Input Signals from 3TX-ISE Transmitters

P09 Range On 3TX-ISE or 3TX-ISE-kilo	P06 Setting on 3TX-REL	P07 Setting for ISE/TOT on 3TX-REL	P09 Minimum Limit on 3TX-REL 4mA low setpoint	P10 Maximum Limit on 3TX-REL 20mA high setpoint	Min Scaling between P09 & P10 on REL
Lo 0-10 ppm	**ISE**	**Lo** 0-10 ppm	0.00 ppm **Match P10 on 3TX-ISE**	9.99 ppm **Match P11 on 3TX-ISE**	2.00 ppm
Mi 0-100 ppm	**ISE**	**Mi** 0-100 ppm	0.0 ppm **Match P10 on 3TX-ISE**	99.9 ppm **Match P11 on 3TX-ISE**	20.0 ppm
Hi 0-1,000 ppm	**ISE**	**Hi** 0-1,000 ppm	0 ppm **Match P10 on 3TX-ISE**	999 ppm **Match P11 on 3TX-ISE**	200 ppm
Lo 0-10,000 ppm	**ISE(-kilo)**	**Lo** 0-10 kilo-ppm	0.00 kilo-ppm **Match P10 on 3TX-ISE**	9.99 kilo-ppm **Match P11 on 3TX-ISE**	2.00 kilo-ppm (2,000 ppm)
Mi 0-100,000 ppm	**ISE(-kilo)**	**Mi** 0-100 kilo-ppm	0.0 kilo-ppm **Match P10 on 3TX-ISE**	99.9 kilo-ppm **Match P11 on 3TX-ISE**	20.0 kilo-ppm (20,000 ppm)
Hi 0-1,000,000 ppm	**ISE(-kilo)**	**Hi** 0-1,000 kilo-ppm	0 kilo-ppm **Match P10 on 3TX-ISE**	999 kilo-ppm **Match P11 on 3TX-ISE**	200 kilo-ppm (200,000 ppm)

NOTE FOR 3TX-ISE TRANSMITTERS:
Analog output scaling based upon P10 & P11 may differ from MODBUS output scaling these type of transmitters.

Configuration of Analog Total ISE Input Signals from 3TX-TOT Transmitters

P24 Range On 3TX-TOT	P06 Setting on 3TX-REL	P07 Setting for ISE/TOT on 3TX-REL	P09 Minimum Limit on 3TX-REL 4mA low setpoint	P10 Maximum Limit on 3TX-REL 20mA high setpoint	Min Scaling between P09 & P10 on REL
Lo 0-10 ppm	**ISE**	**Lo** 0-10 ppm	0.00 ppm **Match P25 on 3TX-TOT**	9.99 ppm **Match P26 on 3TX-TOT**	2.00 ppm
Mi 0-100 ppm	**ISE**	**Mi** 0-100 ppm	0.0 ppm **Match P25 on 3TX-TOT**	99.9 ppm **Match P26 on 3TX-TOT**	20.0 ppm
Hi 0-1,000 ppm	**ISE**	**Hi** 0-1,000 ppm	0 ppm **Match P25 on 3TX-TOT**	999 ppm **Match P26 on 3TX-TOT**	200 ppm
Lo 0-10,000 ppm	**ISE(-kilo)**	**Lo** 0-10 kilo-ppm	0.00 kilo-ppm **Match P25 on 3TX-TOT**	9.99 kilo-ppm **Match P26 on 3TX-TOT**	2.00 kilo-ppm (2,000 ppm)
Mi 0-100,000 ppm	**ISE(-kilo)**	**Mi** 0-100 kilo-ppm	0.0 kilo-ppm **Match P25 on 3TX-TOT**	99.9 kilo-ppm **Match P26 on 3TX-TOT**	20.0 kilo-ppm (20,000 ppm)
Hi 0-1,000,000 ppm	**ISE(-kilo)**	**Hi** 0-1,000 kilo-ppm	0 kilo-ppm **Match P25 on 3TX-TOT**	999 kilo-ppm **Match P26 on 3TX-TOT**	200 kilo-ppm (200,000 ppm)

NOTE FOR 3TX-TOT TRANSMITTERS:
Analog output scaling based upon P25 & P26 may differ from MODBUS output scaling these type of transmitters

Configuration of Analog Dissolved Oxygen (DO) Signals from 3TX-DO(-T) Transmitters

Output Mode on 3TX-DO or 3TX-DO-T	P06 Setting on 3TX-REL	P09 Minimum Limit on 3TX-REL 4mA low setpoint	P10 Maximum Limit on 3TX-REL 20mA high setpoint	Min Scaling between P09 & P10 on REL
ppm units	**Do.P**	0.00 ppm **Match P14 on 3TX-DO(-T)**	40.0 ppm **Match P15 on 3TX-DO(-T)**	4.00 ppm
% Saturation	**Do.S**	0% saturation **Match P14 on 3TX-DO(-T)**	400% saturation **Match P15 on 3TX-DO(-T)**	40% saturation

NOTE FOR 3TX-DO TRANSMITTERS:
Analog output scaling based upon P14 & P15 with MATCH the MODBUS output scaling for dissolved oxygen (DO) transmitters

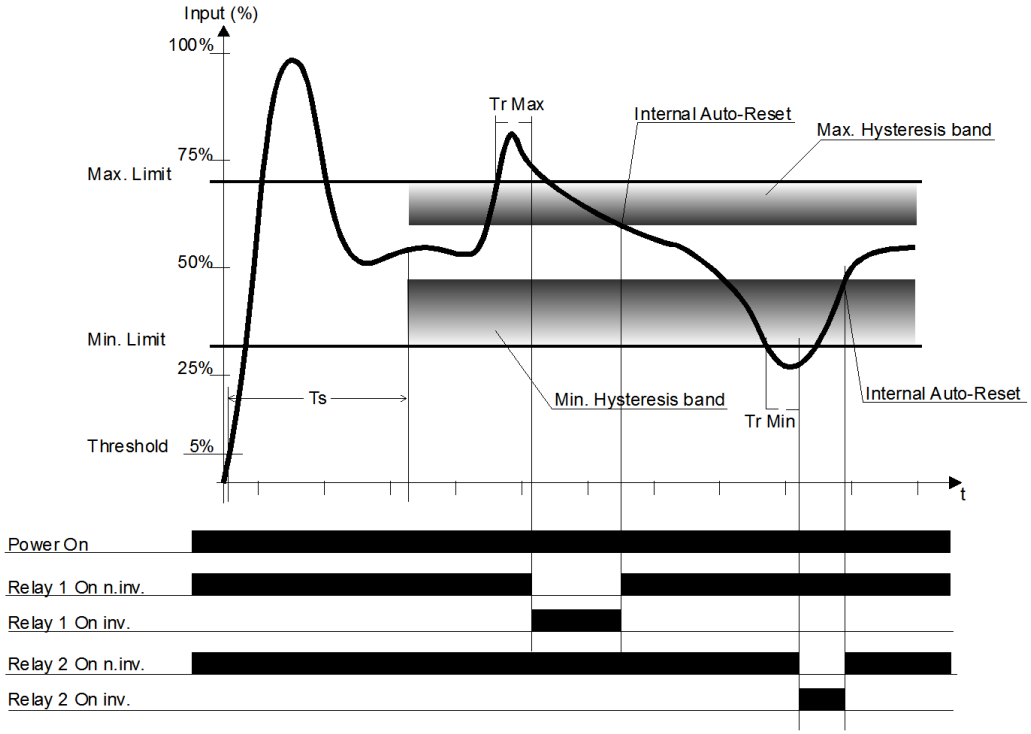
DISPLAY FEATURES ON 3TX-REL IN MAIN INPUT LED MODE

* When the 'Down' button is pushed, the type of input (set with P06) is shown.
* When the 'Up' button is pushed, the current mA input received is shown (see P09 & P10 for input scaling limits).

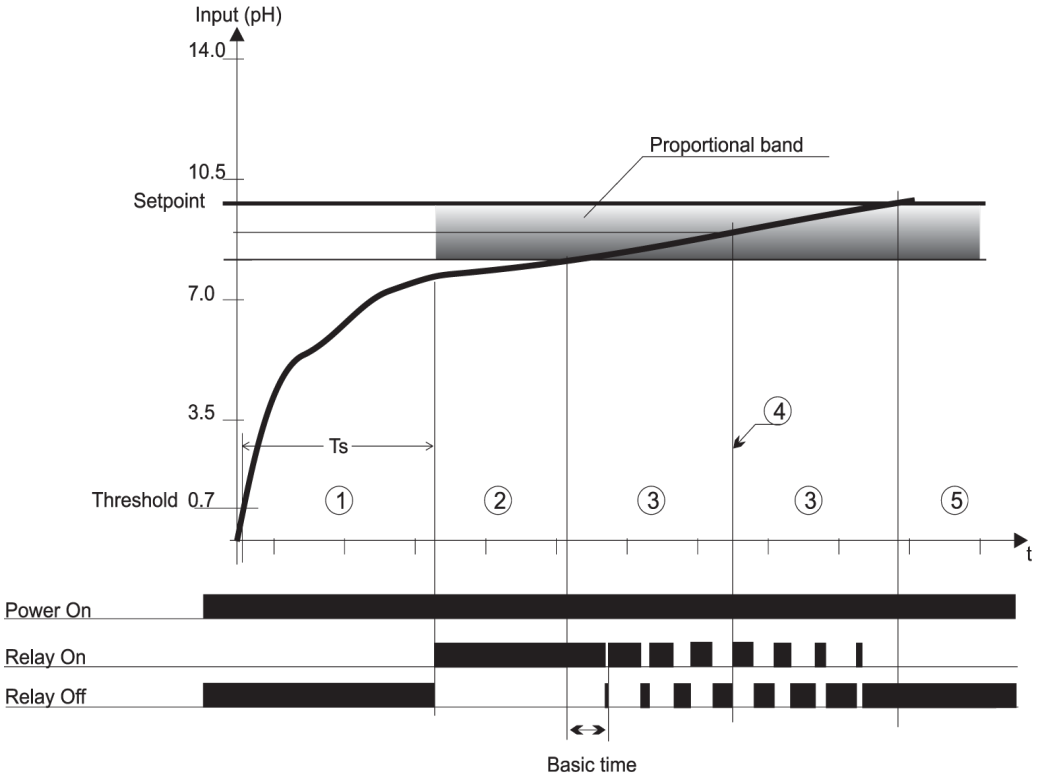
GENERAL NOTES:

- The values displayed on REL should match that on the module that is supplying the analog input within the typical uncertainty for interfacing analog outputs & inputs together. If the values are off significantly this most likely means the REL is incorrectly configured. Use the display features and configuration tables above to resolve such issues.
- If the configuration/setup looks correct but the values are still not exactly matching then this can be resolved by fine tuning the analog trim calibrations from the measurement module serving as the analog output or else the analog input trim calibrations on the REL (or else both sets of trim can be adjusted to get best agreement possible).
- The output mode of the 3TX module that serves as analog input to the REL should be non-inverted. If the contact relays need to operate in an inverted manner for control logic, this is configurable from REL parmameters P19 & P20.

Common Control Schemes with 3TX-REL Controller Module



The On/Off type control scheme is illustrated above (P11/P12 = 1) with the hystersis dead band set with P17/P18.



Time proportional control (TPC) scheme is illustrated above (P11/P12 = 2) with proportional band set with P17/P18.