TEXMATE INC

MULTI-DIGITAL INPUT/OUTPUT

OR82
Standard Board
plus Add-on Board.
6 Inputs.
16 Outputs

Add-on Board.
10 Outputs

3k7 V rms
Opto-isolation

Interface to
Tiger Controller.

Interface to DIN-rail
Terminal Block
via 3M IDC Cable.

OR81
Standard Board.
6 Inputs, 6 Outputs
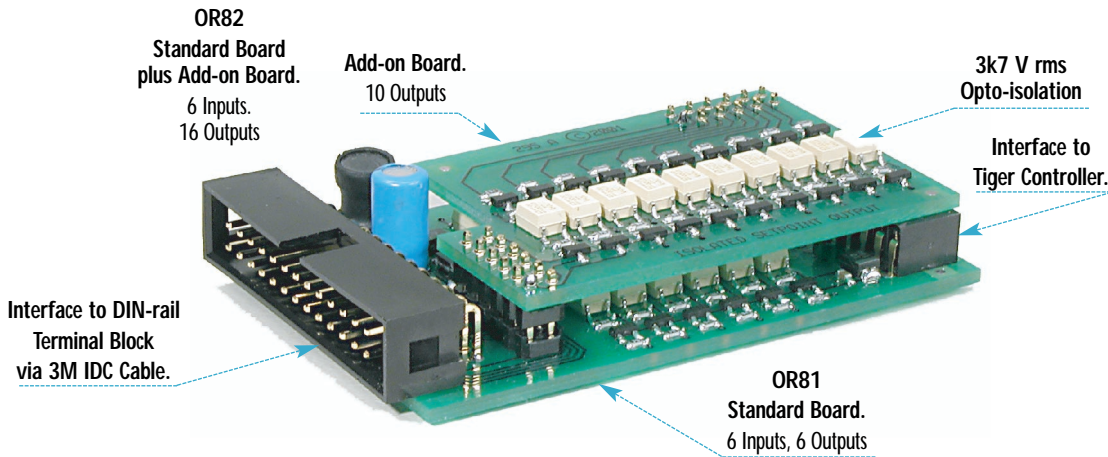
A multi-input/output module for I/O intensive applications with Tiger 320 Series controllers.

INPUT / OUTPUT MODULE ORDER CODE

OR81: 6 Inputs, 6 Outputs
OR82: 6 Inputs, 16 Outputs

Fits Tiger 320 Series

Introduction

The multi-input/output module combines six opto-isolated digital inputs with up to 16 opto-isolated open collector outputs. OR81 is the standard version and has six inputs and six outputs available. OR82 is a two-layered version with an add-on board mounted on top of the standard board and has an additional 10 outputs. Setpoints SP1 to SP6 are standard user programmable controller setpoints with front panel annunciator LEDs. Setpoints SP7 to SP16 and inputs IN1 to IN6 are controlled by a pre-programmed macro. The extra 10 outputs extends the six standard programmable setpoints in the controller to 16 fully programmable setpoints on a single module.

Combined with the three digital inputs available on all Tiger 320 Series controllers (lock, hold, capture pins), the controller can have a total of nine digital inputs (6 are opto-isolated open collector) and 16 outputs. See *Total Available Inputs/Outputs* opposite.

Specifications

Digital Inputs – IN1 to IN6

- Digital inputs 0 to +18 V DC (40 mA maximum) with +2 V threshold.
- Optional sink or source input and isolated +18 V DC power supply for user interface configurations.
- Isolated ground and opto-isolation to 3,700 rms volts.

Digital Outputs – Setpoints SP1 to SP16

- Open collector NPN transistor outputs.
- User supplied pull-up resistor, 200 mA DC maximum.
- Isolated ground and opto-isolation to 3,700 rms volts.

Total Available Inputs/Outputs

Controller

All Models: . . .**4** individual analog inputs to separate channels (CH1-CH4).

6 setpoints with front panel annunciators (Up to 6 relays depending on relay output board installed).

3 digital inputs (lock, hold, capture pins).

Multi-I/O Module (replaces relay output board)

OR81: . . . . . .6 digital inputs (standard board).

6 digital outputs (standard board).

OR82: . . . . . .6 digital inputs (standard board).
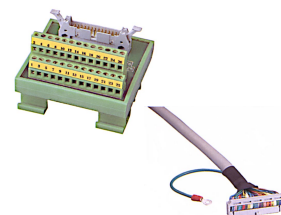
6 digital outputs (standard board).

10 digital outputs (add-on board).

Options

Standard Connectors

OM-DRTERMBLK: . .DIN-rail Terminal Block.

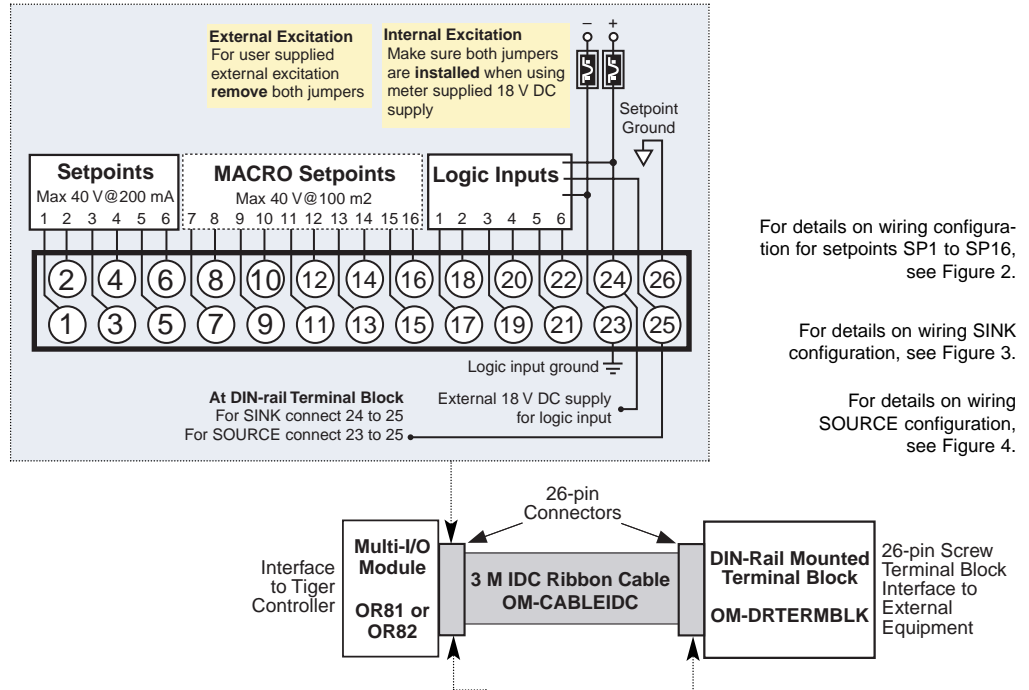**OM-CABLEIDC**: . . . .IDC Cable, 3 Feet long.

Connecting to the Multi-I/O Module

The multi-I/O module combines 16 setpoint control outputs and 6 digital inputs with complete opto-isolation.

The multi-I/O module is connected to a 26-pin DIN-rail mounted terminal block using a 3M IDC ribbon cable. The terminal block pin connections correspond to the pin numbers on the multi-I/O module connector.

See Figure 1 for pin descriptions. See Figure 5 for a functional diagram of the multi-I/O module.

External Excitation
For user supplied external excitation **remove** both jumpers

Internal Excitation
Make sure both jumpers are **installed** when using meter supplied 18 V DC supply

Setpoint Ground

Setpoints
Max 40 V @ 200 mA
1 2 3 4 5 6

MACRO Setpoints
Max 40 V @ 100 m2
7 8 9 10 11 12 13 14 15 16

Logic Inputs
1 2 3 4 5 6

(2)(4)(6)(8)(10)(12)(14)(16)(18)(20)(22)(24)(26)
(1)(3)(5)(7)(9)(11)(13)(15)(17)(19)(21)(23)(25)

Logic input ground ⏚

At DIN-rail Terminal Block
For SINK connect 24 to 25
For SOURCE connect 23 to 25

External 18 V DC supply for logic input

For details on wiring configuration for setpoints SP1 to SP16, see Figure 2.

For details on wiring SINK configuration, see Figure 3.
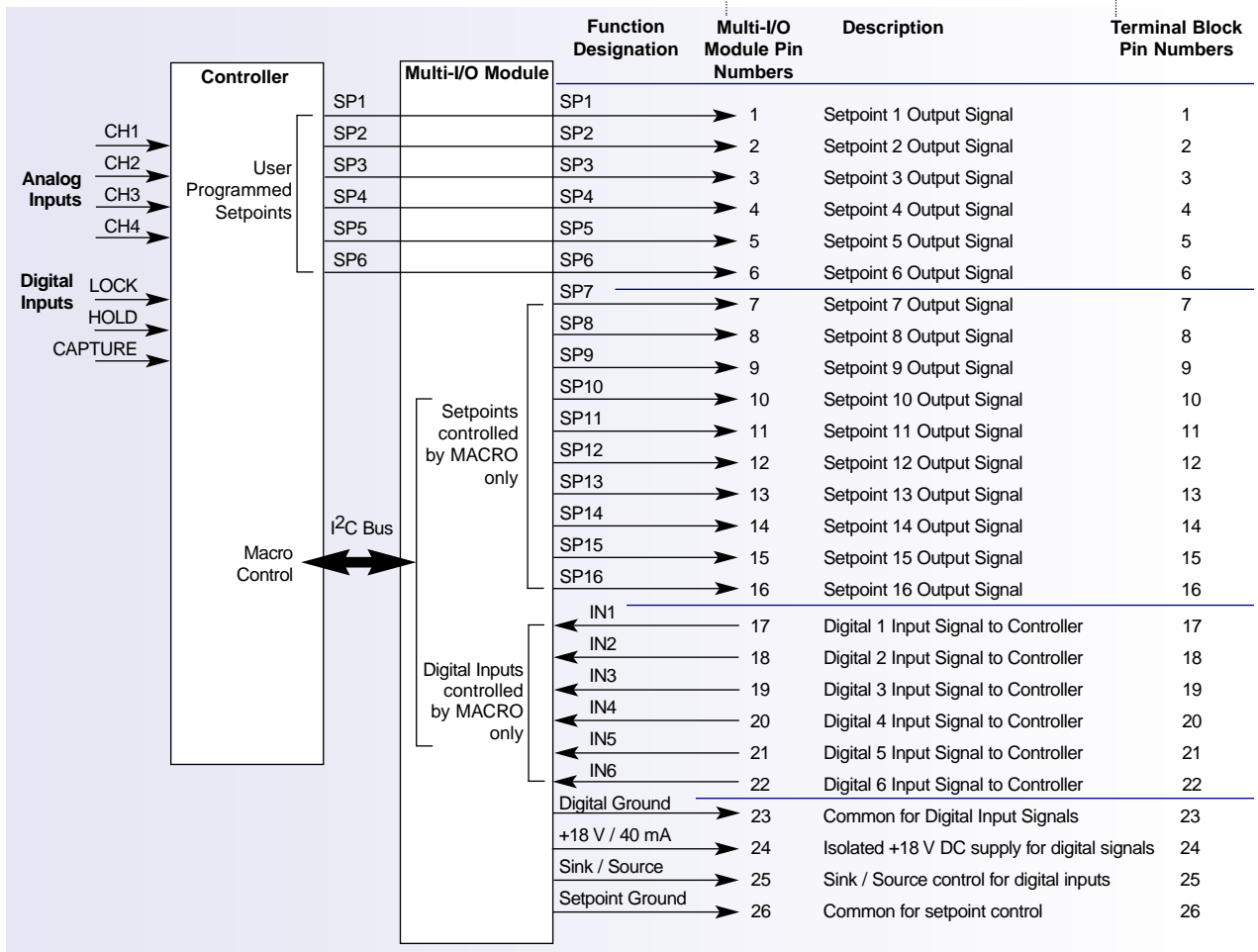
For details on wiring SOURCE configuration, see Figure 4.

26-pin Connectors

Interface to Tiger Controller

Multi-I/O Module
OR81 or OR82

3 M IDC Ribbon Cable OM-CABLEIDC

DIN-Rail Mounted Terminal Block
OM-DRTERMBLK

26-pin Screw Terminal Block Interface to External Equipment

			Function Designation	Multi-I/O Module Pin Numbers	Description	Terminal Block Pin Numbers
Controller	**Multi-I/O Module**	SP1	SP1	1	Setpoint 1 Output Signal	1
		SP2	SP2	2	Setpoint 2 Output Signal	2
	User Programmed Setpoints	SP3	SP3	3	Setpoint 3 Output Signal	3
		SP4	SP4	4	Setpoint 4 Output Signal	4
		SP5	SP5	5	Setpoint 5 Output Signal	5
		SP6	SP6	6	Setpoint 6 Output Signal	6
			SP7	7	Setpoint 7 Output Signal	7
			SP8	8	Setpoint 8 Output Signal	8
			SP9	9	Setpoint 9 Output Signal	9
	Setpoints controlled by MACRO only		SP10	10	Setpoint 10 Output Signal	10
			SP11	11	Setpoint 11 Output Signal	11
			SP12	12	Setpoint 12 Output Signal	12
			SP13	13	Setpoint 13 Output Signal	13
			SP14	14	Setpoint 14 Output Signal	14
			SP15	15	Setpoint 15 Output Signal	15
			SP16	16	Setpoint 16 Output Signal	16
			IN1	17	Digital 1 Input Signal to Controller	17
			IN2	18	Digital 2 Input Signal to Controller	18
			IN3	19	Digital 3 Input Signal to Controller	19
	Digital Inputs controlled by MACRO only		IN4	20	Digital 4 Input Signal to Controller	20
			IN5	21	Digital 5 Input Signal to Controller	21
			IN6	22	Digital 6 Input Signal to Controller	22
			Digital Ground	23	Common for Digital Input Signals	23
			+18 V / 40 mA	24	Isolated +18 V DC supply for digital signals	24
			Sink / Source	25	Sink / Source control for digital inputs	25
			Setpoint Ground	26	Common for setpoint control	26

Analog Inputs — CH1, CH2, CH3, CH4

Digital Inputs — LOCK, HOLD, CAPTURE

I^2C Bus

Macro Control

Figure 1 – Multi-I/O to Terminal Block Connection Diagram

Wiring Configuration for Setpoint Control

See Figure 2. Resistor Rp on each opto-isolator is a user supplied pull-up resistor and must limit the current through each transistor, TR1 to TR16, to less than a maximum of 200 mA DC.
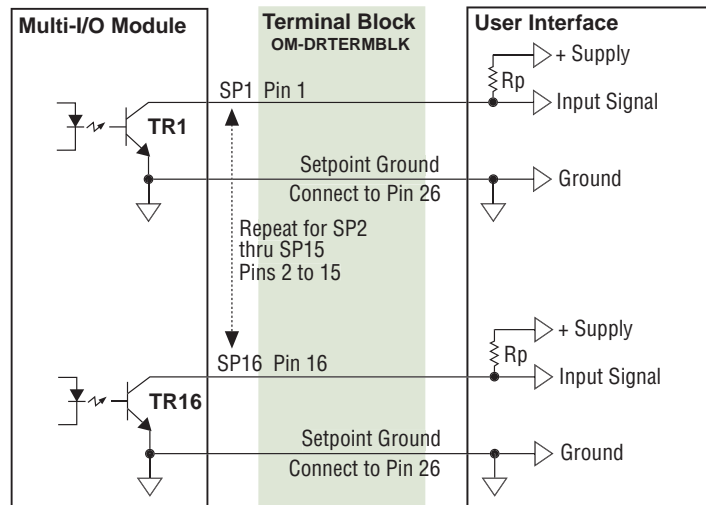

Figure 2 – Wiring Configuration for Setpoint Control SP1 to SP16

Wiring Configuration for Digital Inputs IN1 to IN6

Digital inputs IN1 to IN6 are opto-isolated from the controller and can have their own separate +18 V isolated power supply or a user supplied power supply. Either can be configured for **sink** or **source** option at the inputs. A comparator sets a threshold active signal at greater than +2 V DC.

See Figure 3 for SINK configuration and Figure 4 for SOURCE configuration.
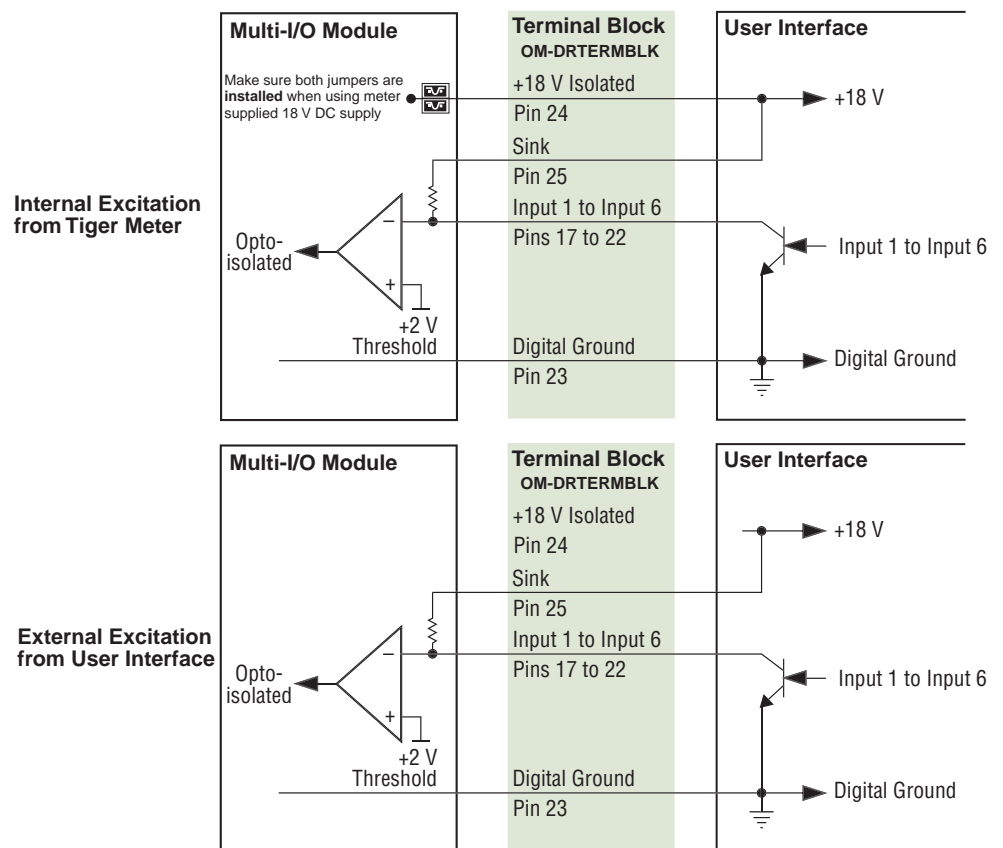
Figure 3 – Wiring for SINK Configuration

Multi-I/O Module

Make sure both jumpers are **installed** when using meter supplied 18 V DC supply

Internal Excitation from Tiger Meter

Opto-isolated

+2 V Threshold

Terminal Block
OM-DRTERMBLK

+18 V Isolated
Pin 24

Source
Pin 25
Input 1 to Input 6
Pins 17 to 22

Digital Ground
Pin 23

User Interface

+18 V

Input 1 to Input 6

Digital Ground

Multi-I/O Module

External Excitation from User Interface

Opto-isolated

+2 V Threshold

Terminal Block
OM-DRTERMBLK

+18 V Isolated
Pin 24

Source
Pin 25
Input 1 to Input 6
Pins 17 to 22

Digital Ground
Pin 23

User Interface

+18 V

Input 1 to Input 6

Digital Ground

Figure 4 – Wiring for SOURCE Configuration

Multi-I/O Module

Opto-isolators

Tiger SP1-SP6

SP1 to SP6

SP7 to SP16

Tiger I²C Bus

Serial to Parallel Converter

SP7 to SP16

IN1 to IN6

Ribbon Cable

SP1 to SP16

Setpoint Ground

Sink / Source Option

Digital Inputs IN1 to IN6

To 26-pin Terminal Block

+2 V Threshold

Jumpers installed for internal supply only

Tiger 320 Isolated +18 V DC Supply

GND
+18 V

Digital Ground
+18 V
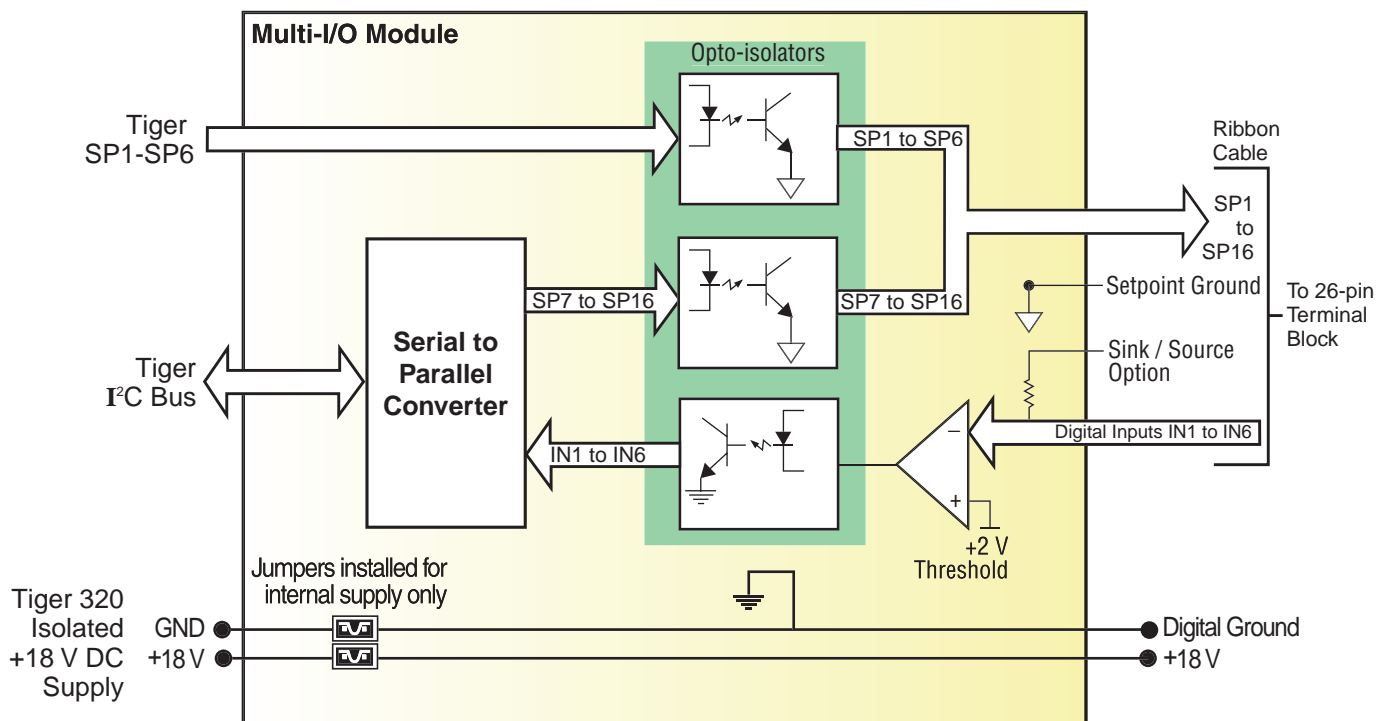
Figure 5 – Multi-I/O Module Function Diagram

Using 18 V DC Supply

Make sure both jumpers are installed when using the isolated +18 V DC power supply from the controller's main power supply.

See Figure 6.

18 V DC Isolated Supply
Jumpers Installed

Standard
Board →

Add-on
Board →
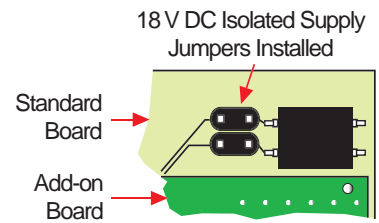
Figure 6 – +18 V DC Supply Jumpers Installed

Programming Macro Controlled Inputs and Outputs

While the controller's standard inputs and setpoint outputs can be fully programmed from the front panel or through the serial port using the Texmate configuration utility program, the six digital inputs (IN1 to IN6) and 10 digital outputs (SP7 to SP16) on the multi-I/O module can only be operated through a macro.

Macro control of the I/O module is through controller registers 808 and 809:

- Digital Outputs: Register Number 808 – Setpoints SP7 to SP16. *See Table 1.*
- Digital Inputs: Register Number 809 – Digital Inputs IN1 to IN6. *See Table 2.*

Register Number 808

16-bit register with output bit flags for multi I/O module.

Table 1	Digital Outputs SP7 to SP16			
Digital Input	**Register Name**	**Description**	**Symbol Type**	**Register Number**
SP1	DO_1	Digital output 1. Bit flag which shows/controls the status of digital output 1 on the multi I/O module (1=output active).	B_0	808
SP2	DO_2	Digital output 2. Bit flag which shows/controls the status of digital output 2 on the multi I/O module (1=output active).	B_1	808
SP3	DO_3	Digital output 3. Bit flag which shows/controls the status of digital output 9 on the multi I/O module (1=output active).	B_2	808
SP4	DO_4	Digital output 4. Bit flag which shows/controls the status of digital output 4 on the multi I/O module (1=output active).	B_3	808
SP5	DO_5	Digital output 5. Bit flag which shows/controls the status of digital output 5 on the multi I/O module (1=output active).	B_4	808
SP6	DO_6	Digital output 6. Bit flag which shows/controls the status of digital output 6 on the multi I/O module (1=output active).	B_5	808
SP7	DO_7	Digital output 7. Bit flag which shows/controls the status of digital output 7 on the multi I/O module (1=output active).	B_6	808
SP8	DO_8	Digital output 8. Bit flag which shows/controls the status of digital output 8 on the multi I/O module (1=output active).	B_7	808
SP9	DO_9	Digital output 9. Bit flag which shows/controls the status of digital output 9 on the multi I/O module (1=output active).	B_8	808
SP10	DO_10	Digital output 10. Bit flag which shows/controls the status of digital output 10 on the multi I/O module (1=output active).	B_9	808

Register Number 809

32-bit read only register with bit flags for multi I/O module.

Digital Input	Register Name	Description	Symbol Type	Register Number
Table 2	**Digital Inputs IN1 to IN6**			
IN1	DI_1	Digital input 1. Read only bit flag that shows/controls the status of digital input 1 on the multi I/O module (1=input active).	B_0_R	809
IN2	DI_2	Digital input 2. Read only bit flag that shows/controls the status of digital input 2 on the multi I/O module (1=input active).	B_1_R	809
IN3	DI_3	Digital input 3. Read only bit flag that shows/controls the status of digital input 3 on the multi I/O module (1=input active).	B_2_R	809
IN4	DI_4	Digital input 4. Read only bit flag that shows/controls the status of digital input 4 on the multi I/O module (1=input active).	B_3_R	809
IN5	DI_5	Digital input 5. Read only bit flag that shows/controls the status of digital input 5 on the multi I/O module (1=input active).	B_4_R	809
IN6	DI_6	Digital input 6. Read only bit flag that shows/controls the status of digital input 6 on the multi I/O module (1=input active).	B_5_R	809

For detailed information on Tiger 320 series controller registers, see Texmate document: Register Supplement (NZ209).

As the multi-I/O module can only be fully utilized using a macro, it is assumed that the user is familiar with macro programming.

For detailed information on programming macros for Tiger 320 series controller, see Texmate document: TDS Macro Tutorial (NZ212).

Example

Setpoint outputs SP7 and SP8 are controlled by digital output registers DO_1 and DO_2 and are named PUMP and VALVE in the example macro screen. Digital inputs IN1 and IN2 are controlled by digital input registers DI_1 and DI_2 and are named UPPER_LEVEL and LOWER_LEVEL in the example macro screen.

The Main Macro reads the level of inputs IN1 and IN2 and controls the pump and valve status (ON or OFF) via setpoints SP6 and SP7.

```
Controls SP7    Controls SP8

    Macro On/Off      Erase Macro

1   //********************************************************************
2   //                     Example macro for I/O module
3
4   BIT |PUMP=|DO_1              // output |DO_1 is renamed as |PUMP
5   BIT |VALVE=|DO_2             // output |DO_2 is renamed as |VALVE
6
7   BIT |UPPER_LEVEL=|DI_1       // input |DI_1 is renamed as |UPPER_LEVEL
8   BIT |LOWER_LEVEL=|DI_2       // input |DI_2 is renamed as |LOWER_LEVEL
9                                           Controls IN1
10  Main_Macro:
11    IF |UPPER_LEVEL = ON THEN             Controls IN2
12       |PUMP=ON
13       |VALVE=OFF
14
15    ELSIF |LOWER_LEVEL = OFF THEN
16       |PUMP=OFF
17       |VALVE=ON
18    ENDIF
19  END
```

Tiger 320 Macro Overview

The Tiger 320 Series of programmable meter controllers have been designed to incorporate the analog and digital functionality of an intelligent controller with the logic of a PLC.

Traditionally, the PLC approach is to build a working application entirely in some form of programming language. The approach used in the Tiger 320 Series of controllers is to build an application by selecting the pre-programmed functions of the controller and then adding small amounts of programmability and logic where needed.

The operating system of the Tiger 320 controller controls all the pre-programmed functions, handling the input, averaging, scaling, linearization, totalization and much more, as well as driving the display, timers, relays, analog and serial outputs. Once configured, these functions are executed by the operating system and form the basis of a control system.

To form an advanced automation and control system you only need to write a small program that adds the extra logic required. We call this program a macro. A macro can be written specifically for your application and is used to initiate a sequence, reconfigure, or disable some of the controller functions. With Texmate's 22 I/O plug-in module installed, a macro further expands the Tiger 320 operating system with additional digital status inputs and digital switched outputs.

Macro control is ideal for many OEM applications that require analog, digital, and timer functions with sophisticated mathematical and enhanced logic operations. The macro concept has major cost advantages for large or small sophisticated applications that require some degree of programmable logic control with display and front panel control.

Custom Macro Programming

Texmate's Tiger Development System (TDS) enables a macro to be written and compiled in BASIC, utilizing any combination of the hundreds of functions and thousands of registers embedded in the Tiger 320 Operating System. When your BASIC program is compiled into Tiger 320 Macro-language it is error checked and optimized.

Macros are useful when implementing a specialized control system that cannot be achieved by the standard configuration capability of the Tiger 320 Operating System. Using the TDS software, functions can be altered or added in a standard controller to perform the required job. This may typically include logic sequencing functions and mathematical functions.

Developing a Macro is much easier and quicker than programming a PLC, because the basic code required to customize the Tiger meter is considerably less than the ladder logic programming required for PLCs. This is due to the hundreds of functions built into the Tiger controller that can be manipulated or invoked by a macro to fulfill the requirements of almost any application.

Scrolling display messages can be programmed to appear with any setpoint activation, selected event, or logic input. Easy to read, plain text prompts can be programmed to replace the manual programming codes and provide a user-friendly interface for any custom application.

Scrolling Text Messaging

Scrolling text messaging is another bonus from running a macro. Any number of messages for detailed operator instructions, of up to 100 characters each, can be written into the macro during compilation for detailed operator instructions, alarm and control applications.

A scrolling text message can be written for OEMs and sensor manufacturers providing informative instructions for setup and calibration procedures.
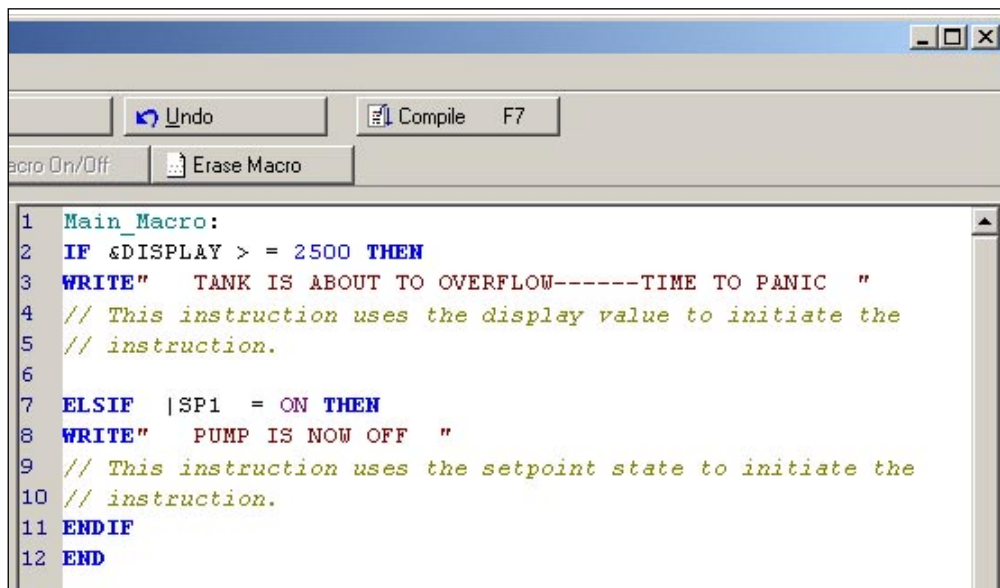

Alphanumeric Displays
14-segment alphanumeric displays are Texmate's display choice for easy to read display text and scrolling text messaging.

	7-SEGMENT		14-SEGMENT
For "tank low" as:		— or —	
or for "slow" as:		— or —	

The following example shows a text messaging macro triggered from a display value and set-point state.

Note:
The SP1 value is adjustable by the operator. The IF & DISPLAY value is not adjustable by the operator.

```
          🔄 Undo              📋 Compile   F7

acro On/Off        📋 Erase Macro

1   Main_Macro:
2   IF &DISPLAY > = 2500 THEN
3   WRITE"   TANK IS ABOUT TO OVERFLOW------TIME TO PANIC  "
4   // This instruction uses the display value to initiate the
5   // instruction.
6
7   ELSIF  |SP1  = ON THEN
8   WRITE"   PUMP IS NOW OFF   "
9   // This instruction uses the setpoint state to initiate the
10  // instruction.
11  ENDIF
12  END
```

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