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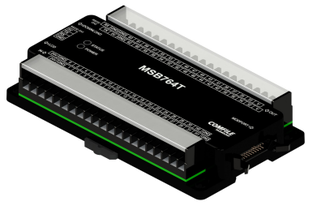
MSB764T User's Manual



Thank you for your purchase from Comfile Technology

Before making use of this product please be sure to read and observe all safety precautions.

⚠ Warning

1. **For instruments with risk to life or property (e.g. nuclear power control, medical equipment, vehicles, railways, aviation, combustion equipment, recreation equipment, safety devices, etc.), always employ adequate fail-safe mechanisms.**
   - Risk of fire, personal injury, and/or property damage.
2. **Always mount to a panel.**
3. **Do not attempt to repair, inspect, or wire while power is applied.**
4. **Do not attempt to alter or repair. Refer to a qualified technician.**
5. **Confirm all electrical connections**

⚠ Caution

1. **Do not use outdoors.**
2. **Always use the product within its specifications and ratings.**
   - Risk of fire and shortening of product's life.
3. **Do not exceed ratings of relay switching contacts.**
4. **Does not use in environments with flammable or explosive materials, moisture, direct sunlight, radiation, vibration and/or shock.**
5. **Keep product free of dust and debris.**
6. **Make connections correctly and confirm polarity by measuring at the appropriate terminals.**

► MSB764T: CE/FCC/KCC Class A

This product is intended for small-scale automation, standalone applications suitable for a Cubloc controller.

◆ What is the Cubloc?

The Cubloc is a brand of industrial controllers that can execute BASIC and Ladder Logic simultaneously. PLCs, typically, can only execute Ladder Logic.

Due to some limitations of Ladder Logic, it is not able to meet users' every control need. The Cubloc, with its support of BASIC programming, was created to compensate for these limitations.

The Cubloc executes Ladder Logic and Basic concurrently without negatively affecting one another. Therefore, users who are familiar with Ladder Logic can use Ladder Logic to implement most features, and use BASIC to complement the project by filling in the gaps.

Conversely, those users most familiar with BASIC can use BASIC to implement most features, and user Ladder Logic to implement any auxiliary functionality.

The ability to use two different, yet mutually complementary, programming methods in one controller is one of the Cubloc's most prominent advantages.

◆ About the MSB Series

The Cubloc core module, in semiconductor form, can be mounted to a PCB. This is advantageous, as users can integrate the Cubloc into a custom PCB design in a manner that suits their taste.

However, to a user without PCB fabrication skills, a custom PCB design can be quite difficult. This user must also have the knowhow to implement the necessary Input and output circuitry.

The MSB series was designed to make it easy for users to employ the Cubloc without having to have professional PCB fabrication technology and skills.

The MSB series can be installed in the field, have its input and output terminal blocks wired, and can be used just like existing PLCs.

◆ MSB User's Manual Composition

For BASIC programming, refer the Cubloc BASIC User's Manual.
For Ladder Logic programming, refer to the Cubloc Ladder Logic User's Manual.

This manual only covers those elements unique to the MSB746T.

◆ CUBLOC STUDIO

To program the MSB series, CUBLOC STUDIO must be used. It can be downloaded from www.ComfileTech.com in the "Cubloc/Cutouch Support" section for free.

◆ MSB7XX Specifications

The MSB7XX series has a core module equivalent to the Cubloc CB400.

- Program Memory : 200KB
- BASIC Data Memory : 6KB
- Ladder Logic Data Memory : 1KB
- EEPROM Memory : 4KB (Only Accessible in BASIC)
- DC24V Input s: 32 (Port Numbers 0 ~ 31)
- NPN TR Outputs: 32 (Port Numbers 32 ~ 63)
- RS232C Communication Port : 2
- High Speed Counter Inputs: 2
- LCD Connection Port : 1
- Real-Time Clock and Built-in Battery (See `RTCRead`/`RTCWrite` functions in the Cubloc Manual).
- Ability to connect to Comfile Technology's ModPort.

A dedicated connection port has been prepared for connection to the Comfile Technology's ModPort providing the ability to add more I/O and other missing features.

◆ MSB Usage Declaration

Insert the following at the very beginning of your source code.

```
#include "MSB7XX"
```

◆ MSB Usage Advice

1. The Cubloc is used as the MSB's core processor. The Cubloc's execution is interpreted and therefore suffers an execution speed penalty. Tens of microseconds are required for each instruction. For a high-performance, modular, C-programmable controller, please consider Comfile Technology's Moacon.

2. Please be careful when using interrupts. Interrupts service routines should execute to completion in as little time as possible to avoid negatively impacting the operation of the system. Please use interrupts sparingly.

3. Due to the nature of floating point numbers, you may notice a slight variation between actual and expected results. For example, 4.0 may appear as 3.99999.

4. Please do not directly analyze incoming RS-232 data. Please use Modbus. Directly analyzing the incoming data can be time consuming if one is not familiar with the format of the data.

◆ BASIC I/O Map

Direction	Range	Input Voltage	Description
Input Port	0 ~ 31	0V or 24VDC	1 if input is 24V 0 if input is 0V
Output Port	32 ~ 63	NPN TR Output	If 1, TR is ON If 0, TR is OFF

Example)

```
Low 32        ' Turn OFF output port number 32
A = In(10)    ' Read state of input at port number 10
```

◆ Ladder Logic Memory Map

Designation	Range	Unit	Function
Input Relay P	P0~P31	1 bit	External Input
Output Relay P	P32~P63	1 bit	Relay, etc.. on/off control
Internal Relay M	M0~M511	1 bit	Internal State
Special Purpose Relay F	F0~F127	1 bit	System Status
Timer T	T0~T99	16 bit (1 word)	For Timer
Counter C	C0~C49	16 bit (1 word)	For Counter
Data Region D	D0~99	16 bit (1 word)	Data Storage

By default, all IO is controlled by BASIC at power on. Ladder Logic must be given permission to use it using the UsePin command.

```
Usepin 0, In      ' From this point on use P0 in Ladder Logic
Usepin 32, Out    ' From this point on, use P32 in Ladder Logic
Set Ladder On     ' Place all UsePin commands before enabling Ladder
```

From now on, in Ladder Logic, P0 is to be used as an input and P32 is to be used as an output.

◆ Status LED

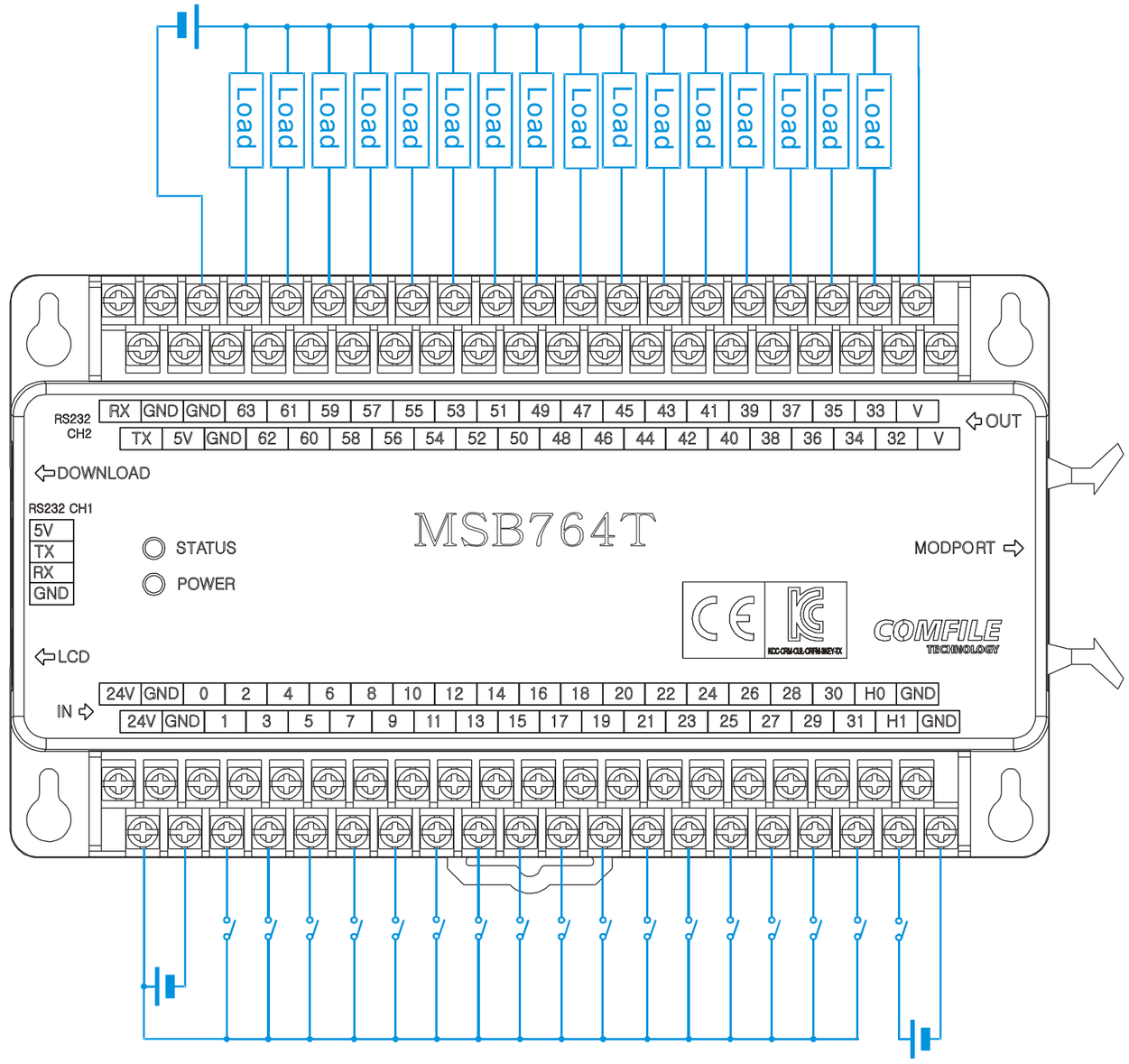
The MSB764T has a programmable status LED. It can be programmed in Ladder Logic using register F64, or in BASIC using the following code.

```
High 64    ' Status LED ON
Low 64     ' Status LED OFF
```

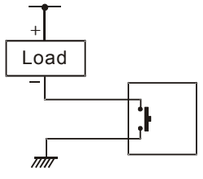
If using BASIC and Ladder Logic together, you can access register F64 from BASIC using the following syntax.

```
Set Ladder On
_F(64) = 1      ' Status LED ON
_F(64) = 0      ' Status LED OFF
```

◆ I/O Wiring

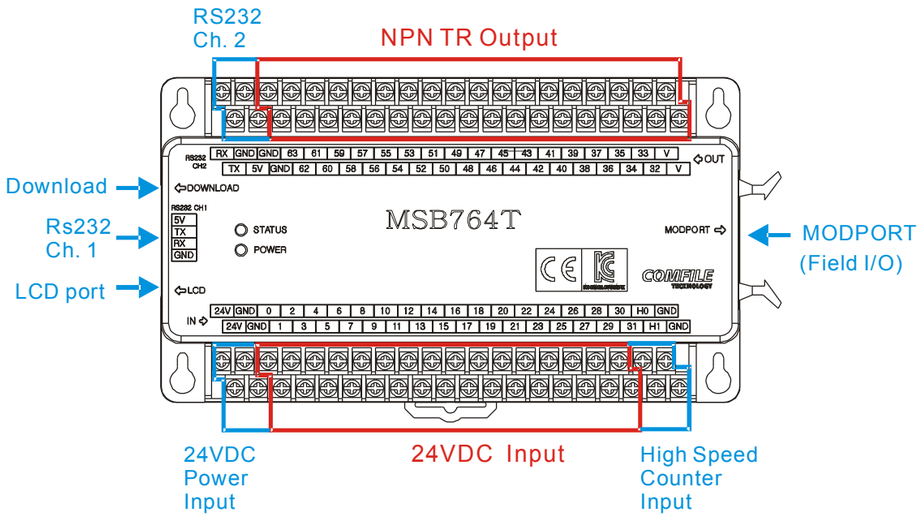


◆ NPN TR Output Description



All outputs are NPN Transistor, current sinking outputs. The V terminal provides flyback voltage suppression. Output HIGH from basic or ON from ladder causes a short to ground. The opposite side of the load must be connected to positive power source.

◆ External Features



If Comfile Technology's CLCD module is connected to the LCD port, CLCD related commands (CLS, CLCDOut, etc...) can be used (refer to www.ComfileTech.com).

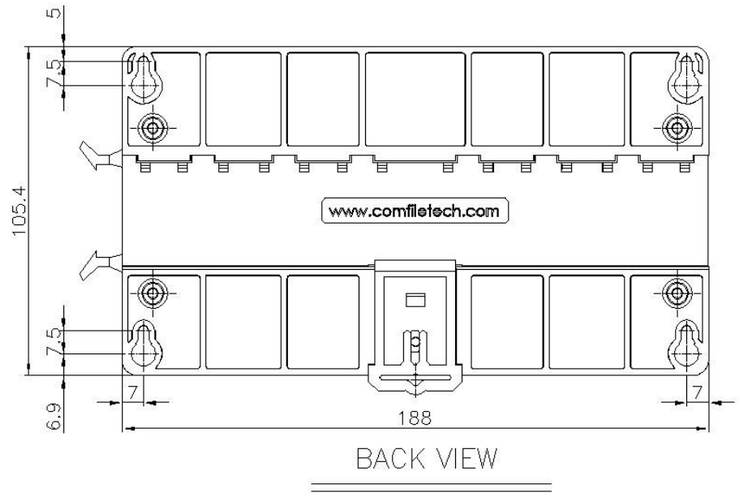
◆ Digitial I/O Specifications

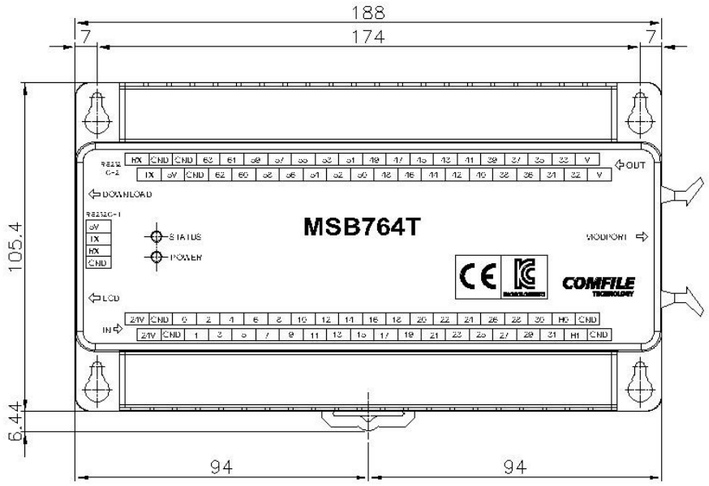
Digital Input Specifications	
Number of Terminals	32
Input Voltage Range	22VDC ~ 26VDC
Operating Voltage	24VDC
ON / OFF Response Rate	1mS
Input Impedance	2.2KΩ @ 24VDC

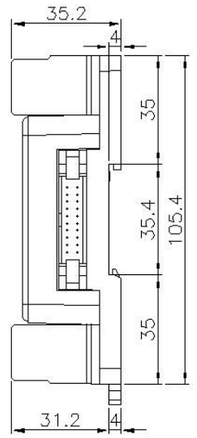
High-Speed Counter Input Specifications	
Number of Terminals	2
Input Voltage Range	22VDC ~ 26VDC
Operating Voltage	24VDC
Maximum Input Frequency	1KHz
Input Impedance	2.2KΩ@ 24VDC

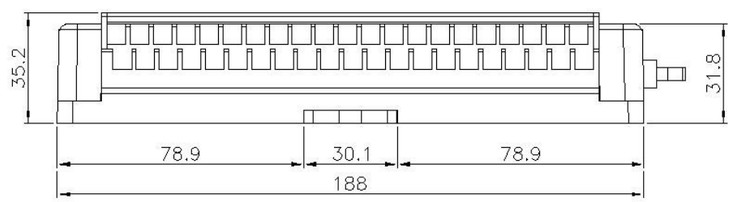
NPN TR Output Specifications	
Number of Terminals	32
Input Voltage	30V
Driving Current	250mA
ON / OFF Maximum Frequency	100Hz (100 times per second)

◆ Dimensions



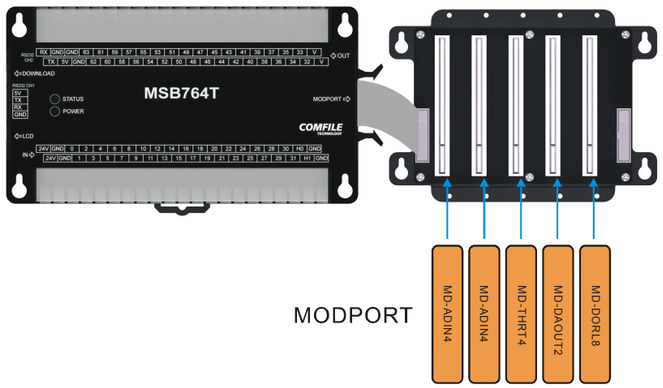






◆ MODPORT Expansion

To expand the I/O capabilities and features (analog input/output, temperature input, etc…) Comfile Technology's ModPort can be added.



What is the ModPort? It is a Modbus field I/O controller with modular features including digital I/O, analog I/O, temperature input, and a variety of other modules.

The MSB764T can be connected to the ModPort's 5-slot board a shown in the figure above. The ModPort header module is not needed.

The ModPort can be controlled using a set of dedicated commands. The Modport can only be controlled using BASIC; Ladder Logic control is not supported.

This manual will describe the different ModPort commands. For instructions on how to wire the ModPort's inputs and outputs, please see the ModPort manual.

By daisy-chaining as many as four 5-slot boards together, the system can be expanded to a maximum of 20 ModPort modules.

◆ MODPORT Commands

MD-DORL8 (8-Channel Relay Output)

`MPRelay ID, Relay, OnOff`

ID : The ID of the ModPort module to use.
Relay : Relay channel to use (0 ~ 7)
OnOff : 0 = OFF, 1 = ON

Example) `MPRelay 1, 3, 1 ' Turn module 1's relay 3 ON.`

Each module can have a different ID set using the rotary switch on the face of the module. This provides the ability to have as many as 10 modules of the same type (0 ~ 9) installed simultaneously.

MD-DOSO8 (8-Channel DC Source Output Module)

`MPSource ID, Channel, OnOff`

ID : The ID of the ModPort module to use.
Channel: Output channel to use (0 ~ 7)
OnOff : 0 = OFF, 1 = ON

Function for 8-channel FET digital output module.

MD-DOSI8 (8-Channel DC Sink Output Module)

`MPSink ID, Channel, OnOff`

ID : The ID of the ModPort module to use.
Channel: Output channel to use (0 ~ 7)
OnOff : 0 = OFF, 1 = ON

Function for 8-Channel FET digital output module.

MD-DIDC8 (DC입력 8점)

`IntegerVariable = MPIn (ID, Channel)`

ID : The ID of the ModPort module to use.
Channel: Input channel to use (0 ~ 7)

Function for 8-Channel digital input module.
Results are stored in an integer variable. 12V ~ 24V results in a 1, otherwise 0

MD-THRT4 (4-Channel Thermistor (RTD) Input)

`IntegerVariable = MPThIn (ID, Channel)`

ID : The ID of the ModPort module to use.
Channel: Channel to use (0 ~ 3)

Function for the 4-channel temperature input module.
The return value is the temperature in °C multiplied by 10. In other words if the module returns the value 254, the actual temperature is 24.5 °C. If an error occurs, the following values may be returned.

9999 – Module could not be found
5555 – Value exceeds valid maximum
-1111 – Value is below valid minimum.

If the return value is negative, the value's most-significant bit will be a 1. Note that this is not 2's complement. For information on wiring the module, please see the ModPort manual.

MD-ADIN4 (4-Channel AD Input Module)

`IntegerVariable = MPADIn ( ID, Channel)`

ID : The ID of the ModPort module to use.
Channel: Channel to use (0 ~ 3)

Function for the 4-channel analog-to-digital input module.
If input is between 1V and 5V, a value between 0 and 10,000 is returned (13.3 bit resolution).
If an error occurs, one of the following values may be returned:

19999 – Module could not be found
55555 – Input is greater than +5V
-11111 – Input is below 1V.

MD-HADIN4 (High-Resolution 4-Channel AD Input Moduel)

`IntegerVariable = MPHADIn (ID, Channel)`

ID : The ID of the ModPort module to use.
Channel: Channel to use (0 ~ 3)

Function for the high-resolution 4-channel analog-to-digital input module.
If input is between 1V and 5V, a value between 0 and 100,000 is returned (16.6 bit resolution).
If an error occurs, one of the following values may be returned:

199999 – Module could not be found
555555 – Input is greater than +5V
-111111 – Input is below 1V.

MD-DAOUT2 (2-Channel DA Voltage Output Module)

`MPDAOutV ( ID, Channel, OutputValue)`

ID : The ID of the ModPort module to use.
Channel: Channel to use (0 ~ 1)
OutputValue: Integer Value (0~60000)

Function for 2-Channel digital-to-analog voltage output module. Change voltage to desired value.

MD-DAOUT2B (2-Channel DA Current Output Module)

`MPDAOutA ( ID, Channel, OutputValue)`

ID : The ID of the ModPort module to use.
Channel: Channel to use (0 ~ 1)
OutputValue: Integer Value (0~60000)

Function for 2-Channel digital-to-analog current output module. Change current to desired value.

Customer Support
Company Name : Comfile Technology Address : 14 Pidgeon Hill Drive, Suite 310, Sterling, VA 20165 Website : http://www.ComfileTech.com Phone : (888) 9CUBLOC, (888) 928 2562, Fax: (571) 322-5011