

**WAGO I/O SYSTEM 750**

## **Library for Building Automation**



### **Module Description for Connecting the Thermokon Multifunction Room Operating Panel WRF 08 RS 485 Modbus**

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Every conceivable measure has been taken to ensure the correctness and completeness of this documentation. However, as errors can never be fully excluded, we would appreciate any information or ideas at any time.

We wish to point out that the software and hardware terms as well as the trademarks of companies used and/or mentioned in the present manual are generally protected by trademark or patent.

**WAGO-I/O-PRO CAA library for building automation**

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## Important Notes

To ensure fast installation and start-up of the units, we strongly recommend that the following information and explanations are carefully read and adhered to.

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### Personnel Qualification

The use of the product detailed in this document is exclusively geared to specialists having qualifications in PLC programming, electrical specialists or persons instructed by electrical specialists who are also familiar with the valid standards. WAGO Kontakttechnik GmbH & Co. KG declines any liability resulting from improper action and damage to WAGO products and third party products due to non-observance of the information contained in this document.

### Intended Use

For each individual application, the components are supplied from the factory with a dedicated hardware and software configuration. Modifications are only admitted within the framework of the possibilities documented in the manuals. All other changes to the hardware and/or software and the non-conforming use of the components entail the exclusion of liability on part of WAGO Kontakttechnik GmbH & Co. KG.

Please direct any requirements pertaining to a modified and/or new hardware or software configuration directly to WAGO Kontakttechnik GmbH & Co. KG.


## Range of Validity

This application note is based on the stated hardware and software of the specific manufacturer as well as the correspondent documentation. This application note is therefore only valid for the described installation. New hardware and software versions may need to be handled differently.

Please note the detailed description in the respective manuals.

# Function Modules

## Master WRF08 (FbWRF08Master)

WAGO-I/O-PRO CAA Library Elements		
<b>Category:</b>	Building Automation	
<b>Name:</b>	FbWRF08Master	
<b>Type:</b>	Function <input type="checkbox"/>	Function block <input checked="" type="checkbox"/> Program <input type="checkbox"/>
<b>Name of the library:</b>	ThermokonWRF08.lib	
<b>Applicable to:</b>	Programmable fieldbus controller (not 750-812 / 814 / 815 / 816 and 758-870)	
<b>Libraries used:</b>	SerComm.lib Serial_Interface_01.lib mod_com.lib Modb_I05.lib	
<b>Input parameter:</b>	<b>Data type:</b>	<b>Comment:</b>
bCOM_PORT	BYTE	No. of the serial interface used 1 -> Internal service interface 2 ->1. inserted serial modules 3 ->2. inserted serial modules
cbCOM_BAUDRATE	COM_BAU DRATE	Baud rate: BAUD_9600 := 960 BAUD_57600:=5760 Default setting = BAUD_9600
<b>Input/output parameter:</b>	<b>Data type:</b>	<b>Comment:</b>
typWRF08	typWRF08	Data exchange between the Master module and the Slave module
<b>Graphical illustration:</b>		
		
<b>Function Description:</b>		
<p>The functional module <b>FbWRF08Master</b> can be used for connecting the WRF08 multifunction room operating panel with the Modbus protocol to the WAGO I/O system. The Modbus communication is carried out using an RS 485 interface module.</p> <p>The <b>FbWRF08Master</b> provides the communication with the multifunction room operating panels using an RS 485 interface module. The connection of the other "WRF08" function blocks is carried out using the variable "<b>typWRF08</b>".</p>		

The number of the serial interface used is set at the input "**bCOM\_PORT**".

**Example:**

- 1 -> Internal service interface
- 2 -> 1. inserted serial modules
- 3 -> 2. inserted serial modules

The baud rate is set at the input "**cbCOM\_BAUDRATE**". The baud rate must correspond with the baud rate of the multifunction room operating panel from Thermokon.

**Hardware**

Either a fixed configured module 750-653/000-021 or the freely configurable module 750-653/003-000 can be used as an RS 485 module.


The freely configurable module should be configured with the software WAGO I/O Check 2 (759-302) as follows:

Baud rate:	9600 or 57600
Data bits:	8
Stop bits:	1
Parity:	Even
Data bytes:	5
Duplex mode:	Halfduplex
Send continually:	Yes

**Note:**

- 1.) The maximum number of WRF08 multifunction room operating panels connected to an RS 485 bus segment is limited to 10 devices.
- 2.) Several RS 485 bus segments can be assembled per node.
- 3.) The WRF08 Master is only allowed to be requested once per RS485 bus segment.

## WRF08 Configuration (FbWRF08Config)

WAGO-I/O-PRO CAA Library Elements		
<b>Category:</b>	Building Automation	
<b>Name:</b>	FbWRF08Config	
<b>Type:</b>	Function <input type="checkbox"/>	Function block <input checked="" type="checkbox"/> Program <input type="checkbox"/>
<b>Name of the library:</b>	ThermokonWRF08.lib	
<b>Applicable to:</b>	Programmable fieldbus controller (not 750-812 / 814 / 815 / 816 and 758-870)	
<b>Graphic interface used:</b>	ConfigWRF08	
<b>Input parameter:</b>		
xEnable	BOOL	Configuration interface release
<b>Input/output parameter:</b>		
typWRF08	typWRF08	Data exchange using the master module FbWRF08Master
<b>Feedback Value:</b>		
enumMB_ERROR	enumMB_ERROR	Communication error display 16#00 = MB_NO_ERROR 16#01 = MB_NOT_SUPPORTED_FUNCTION 16#03 = MB_ILLEGAL_DATA 16#90 = MB_EXTENDED_SLAVE_ERROR 16#96 = MB_CRC_ERROR 16#97 = MB_ILLEGAL_NUMBER_OF_POINTS 16#98 = MB_OVERRUN 16#99 = MB_TIME_OUT
<b>Graphical illustration:</b>		
		
<b>Functional description:</b>		
<p>The function module <b>FbWRF08Config</b> is used for configuring the WRF08 multifunction room operating panel (WRF08-RS485-Modbus). The configuration of the room operating panel only works together with the visualization interface <b>ConfigWRF08</b>.</p> <p>The input / output variable "<b>typWRF08</b>" provides the communication with the master module and must be connected together with the <b>FbWRF08Master</b> using the variable with the same name.</p> <p>The current error code on the output "<b>enumMB_ERROR</b>" is displayed for identifying a communication error. The Enumeration "<b>enumMB_ERROR</b>" is located in the Modb_I05.lib.</p> <p><b>Note:</b> The configuration module and the visualization interface is only required once for each bus segment (max. 10 participants).</p>		



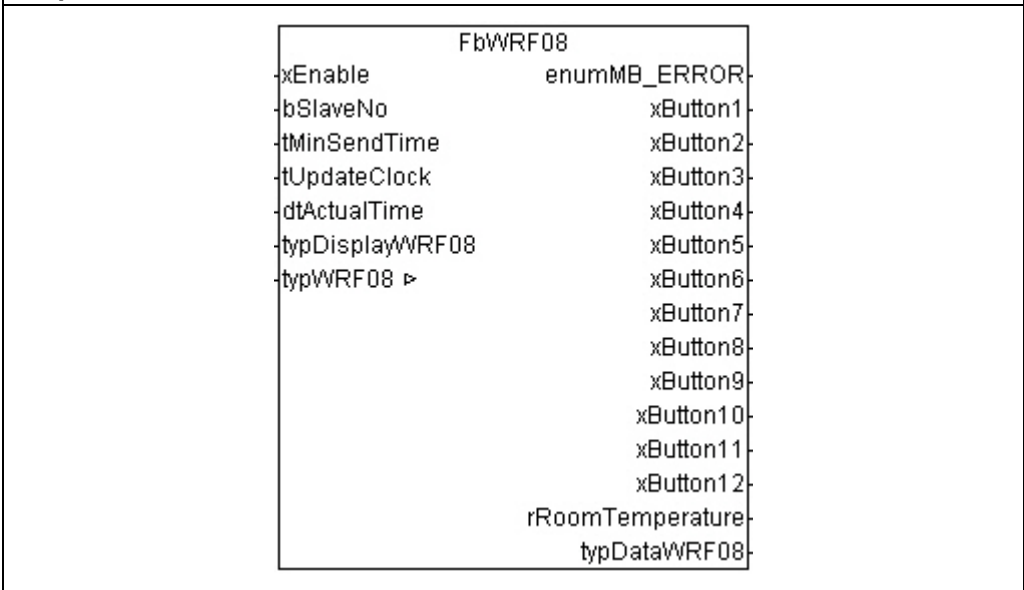
## Triggering WRF08 (FbWRF08)

WAGO-I/O-PRO CAA Library Elements		
<b>Category:</b>	Building Automation	
<b>Name:</b>	FbWRF08	
<b>Type:</b>	Function <input type="checkbox"/>	Function block <input checked="" type="checkbox"/> Program <input type="checkbox"/>
<b>Name of the library:</b>	ThermokonWRF08.lib	
<b>Applicable to:</b>	Programmable fieldbus controller (not 750-812 / 814 / 815 / 816 and 758-870)	
<b>Input parameter:</b>	<b>Data type:</b>	<b>Comment:</b>
xEnable	BOOL	Release of the communication using the room operating panel
bSlaveNo	BYTE	Slave no. of the room operating panel
tMinSendTime	TIME	Minimal time period between the transmission of new display values Default setting = t#5s
tUpdateClock	TIME	Time period for the synchronization of the clock on the display Default setting = t#0s (no update)
dtActualTime	DT	Current time for the synchronization of the clock on the display

Input/output parameter:	Data type:	Comment:
typDisplayWRF08	typDisplay WRF08	Data structure with the display value that should be written in the room operating device
xSymbolFault	BOOL	Show "Fault" symbol
xSymbolHeating	BOOL	Show "Heating" symbol
xSymbolCooling	BOOL	Show "Cooling" symbol
xSymbolWindow	BOOL	Show "Window opened" symbol
xSymbolRoom Occupancy	BOOL	Show "Room occupied" symbol
bLevelFan	BYTE	Default settings of the fan stages
xLedButton5	BOOL	Triggering the LED on button 5
:	:	:
:	:	:
xLedButton12		Triggering the LED on button 12 (Observe the configuration parameter)
rOutdoorTemperature	REAL	Outdoor temperature
rExtTemperatureDefault1	REAL	Default outside temperature 1 [°C]
rExtTemperatureDefault2	REAL	Default outside temperature 2 [°C]
rExtPercentDefault1	REAL	Default outside percent value 1 [%]
rExtPercentDefault2	REAL	Default outside percent value 2 [%]
xValueWithComma	BOOL	Value displayed with comma (Observe the configuration parameter)
rExtValueDefault1	REAL	Extern default value 1
rExtValueDefault2	REAL	Extern default value 2
rBasicSetPoint Temperature1	REAL	Setpoint temperature 1 after reset [°C]
rSetPointTemperature Offset1	REAL	Offset setpoint temperature 1 [K]
rBasicSetPoint Temperature2	REAL	Setpoint temperature 2 after reset [°C]
rSetPointTemperature Offset2	REAL	Offset setpoint temperature 2 [K]
rBasicSetPoint PercentValue1	REAL	Setpoint value percent 1 after reset [%]
rSetPointPercentOffset1	REAL	Offset set value percent 1 [%]
rBasicSetPoint PercentValue2	REAL	Set value percent 2 after reset [%]
rSetPointPercentOffset2	REAL	Offset setpoint value percent 2 [%]
rBasicSetPointValue1	REAL	Setpoint value 1 after reset
rSetPointValueOffset1	REAL	Offset setpoint value 1
rBasicSetPointValue2	REAL	Setpoint value 2 after reset
rSetPointValueOffset2	REAL	Offset setpoint value 2
typWRF08	typWRF08	Data exchange using the master module FbWRF08Master

Feedback Value:	Data type:	Comment:
enumMB_ERROR	enumMB_ERROR	Communication error display 16#00 = MB_NO_ERROR 16#01 = MB_NOT_SUPPORTED_FUNCTION 16#03 = MB_ILLEGAL_DATA 16#90 = MB_EXTENDED_SLAVE_ERROR 16#96 = MB_CRC_ERROR 16#97 = MB_ILLEGAL_NUMBER_OF_POINTS 16#98 = MB_OVERRUN 16#99 = MB_TIME_OUT
xButton1 : : : xButton12	BOOL	Status button 1 : : : Status button 12
rRoomTemperature	REAL	Current room temperature
typDataWRF08	typDataWRF08	Data structure with the current room operating panel values
bLevelFan	BYTE	Fan stage display
xRoomOccupancy	BOOL	Display room occupied
rSetTemperature1_Offset	REAL	Offset setpoint temperature 1 [K]
rSetTemperature1_Effective	REAL	Setpoint temperature 1 effective value [°C]
rSetTemperature2_Offset	REAL	Offset setpoint temperature 2 [K]
rSetTemperature2_Effective	REAL	Setpoint temperature 2 effective value [°C]
rSetPercentValue1_Offset	REAL	Offset setpoint value percent 1 [%]
rSetPercentValue1_Effective	REAL	Setpoint value percent 1 effective value [%]
rSetPercentValue2_Offset	REAL	Offset setpoint value percent 2 [%]
rSetPercentValue2_Effective	REAL	Setpoint value percent 2 effective value [%]
rSetValue1_Offset	REAL	Setpoint value 1 Offset
rSetValue1_Effective	REAL	Setpoint value 1 effective value
rSetValue2_offset	REAL	Setpoint value 2 Offset
rSetValue2_Effective	REAL	Setpoint value 2 effective value

**Graphical illustration:**



**Functional description:**

The **FbWRF08** is used for setting the display values that are displayed on the multifunctional room operating panel. Furthermore, the current status of the room operating panel can be read out.

The slave address of the WRF08 room operating panel is reset at the input **"bSlaveNo"**.

The cyclic read out of the status value from the room operating panel is released with the input **"xEnable"**.

The functional module transmits the display value when any value changes are made in the structure **"typDisplayWRF08"** or when a button is pressed. The input **"tMinSendTime"** states the minimum clearance period for transmitting the new display value.

The input **"tUpdateClock"** specifies the time period for synchronizing the time. On the output **"dtActualTime"** the time is specified that should be used for synchronising the room operating panel. The time will not be synchronized with the update time t#0s.

The input / output variable **"typWRF08"** provides the communication with the master module and must be connected together with the **FbWRF08Master** using the variable with the same name.

The current error code on the output **"enumMB\_ERROR"** is displayed for identifying a communication error. The Enumeration "enumMB\_ERROR" is located in the Modb\_I05.lib.

The outputs **"xButton1"** to **"xButton12"** show the status of the button of the room operating panel.

The output **"rRoomTemperature"** shows the room temperature measured by the WRF08 room operating device.

The current set values + offset of the room operating device are displayed in the structure **"typDataWRF08"**. Furthermore the fan stages and the status of the room allocation are released.

# Visualization Elements

## Configuration Interface WRF08 (WRF08Config)

WAGO-I/O-PRO CAA Library Elements		
<b>Category:</b>	Building Automation	
<b>Name:</b>	WRF08Config	
<b>Name of the library:</b>	ThermokonWRF08.lib	
<b>Applicable to:</b>	Programmable fieldbus controller (not 750-812 / 814 / 815 / 816 and 758-870)	
<b>Placeholder:</b>	<b>Data type:</b>	<b>Comment:</b>
FbWRF08Config	Instance from FbWRF08Config	Link between the instance from FbWRF08Config and the configuration interface
<b>Graphical illustration:</b>		
1. General settings (General)		

## 2. Setpoint value configuration (Setpoint)

General	Setpoint	Display	Buttons
<div style="display: flex; justify-content: space-between;"> <div style="width: 48%;"> <p><b>Setpoint temperature 1</b></p> <p>Upper adjustment range [K]: <input type="text" value="10.0"/> </p> <p>Lower adjustment range [K]: <input type="text" value="-10.0"/> </p> <p>Resolution [K]: <input type="text" value="0.5"/> </p> <p>Basic setpoint after reset [°C]: <input type="text" value="22.0"/> </p> </div> <div style="width: 48%;"> <p><b>Setpoint temperature 2</b></p> <p>Upper adjustment range [K]: <input type="text" value="3.0"/> </p> <p>Lower adjustment range [K]: <input type="text" value="-3.0"/> </p> <p>Resolution [K]: <input type="text" value="0.1"/> </p> <p>Basic setpoint after reset [°C]: <input type="text" value="22.0"/> </p> </div> </div>			
<div style="display: flex; justify-content: space-between;"> <div style="width: 48%;"> <p><b>Setpoint percent value 1</b></p> <p>Upper adjustment range [%]: <input type="text" value="100"/> </p> <p>Lower adjustment range [%]: <input type="text" value="0"/> </p> <p>Resolution [%]: <input type="text" value="5"/> </p> <p>Basic setpoint after reset [%]: <input type="text" value="50"/> </p> </div> <div style="width: 48%;"> <p><b>Setpoint percent value 2</b></p> <p>Upper adjustment range [%]: <input type="text" value="100"/> </p> <p>Lower adjustment range [%]: <input type="text" value="-100"/> </p> <p>Resolution [%]: <input type="text" value="5"/> </p> <p>Basic setpoint after reset [%]: <input type="text" value="55"/> </p> </div> </div>			
<div style="display: flex; justify-content: space-between;"> <div style="width: 48%;"> <p><b>Setpoint value without unit 1</b></p> <p>Upper adjustment range: <input type="text" value="200"/> </p> <p>Lower adjustment range: <input type="text" value="0"/> </p> <p>Resolution: <input type="text" value="20"/> </p> <p>Basic setpoint after reset: <input type="text" value="30"/> </p> </div> <div style="width: 48%;"> <p><b>Setpoint value without unit 2</b></p> <p>Upper adjustment range: <input type="text" value="100"/> </p> <p>Lower adjustment range: <input type="text" value="0"/> </p> <p>Resolution: <input type="text" value="2"/> </p> <p>Basic setpoint after reset: <input type="text" value="25"/> </p> </div> </div>			
Error Message: MB_NO_ERROR			<input type="button" value="Readout"/> <input type="button" value="Write"/>

## 3. Display of the individual values (Display)

General	Setpoint	Display	Buttons												
<p><b>Parameter</b></p> <p>Measuring unit: <input checked="" type="checkbox"/> °C <input type="checkbox"/> °F</p> <p>Display temperature: <input checked="" type="checkbox"/> With decimal point <input type="checkbox"/> Without decimal point</p> <p>Display value without unit: <input checked="" type="checkbox"/> Fade in decimal point <input type="checkbox"/> Fade out decimal point</p>															
<p><b>External value</b></p> <table style="width:100%;"> <tr> <td>Room temperature(internal): <input checked="" type="checkbox"/></td> <td>External percent 1: <input type="checkbox"/></td> </tr> <tr> <td>Outdoor temperature: <input checked="" type="checkbox"/></td> <td>External percent 2: <input type="checkbox"/></td> </tr> <tr> <td>External temperature 1: <input type="checkbox"/></td> <td>External value 1: <input type="checkbox"/></td> </tr> <tr> <td>External temperature 2: <input type="checkbox"/></td> <td>External value 2: <input type="checkbox"/></td> </tr> </table>				Room temperature(internal): <input checked="" type="checkbox"/>	External percent 1: <input type="checkbox"/>	Outdoor temperature: <input checked="" type="checkbox"/>	External percent 2: <input type="checkbox"/>	External temperature 1: <input type="checkbox"/>	External value 1: <input type="checkbox"/>	External temperature 2: <input type="checkbox"/>	External value 2: <input type="checkbox"/>				
Room temperature(internal): <input checked="" type="checkbox"/>	External percent 1: <input type="checkbox"/>														
Outdoor temperature: <input checked="" type="checkbox"/>	External percent 2: <input type="checkbox"/>														
External temperature 1: <input type="checkbox"/>	External value 1: <input type="checkbox"/>														
External temperature 2: <input type="checkbox"/>	External value 2: <input type="checkbox"/>														
<p><b>Setpoints</b></p> <table style="width:100%;"> <tr> <td>Setpoint temperature 1 offset: <input checked="" type="checkbox"/></td> <td>Setpoint percent 1 offset: <input type="checkbox"/></td> <td>Setpoint value 1 offset: <input type="checkbox"/></td> </tr> <tr> <td>Setpoint temperature 1 effective: <input checked="" type="checkbox"/></td> <td>Setpoint percent 1 effective: <input type="checkbox"/></td> <td>Setpoint value 1 effective: <input type="checkbox"/></td> </tr> <tr> <td>Setpoint temperature 2 offset: <input type="checkbox"/></td> <td>Setpoint percent 2 offset: <input type="checkbox"/></td> <td>Setpoint value 2 offset: <input type="checkbox"/></td> </tr> <tr> <td>Setpoint temperature 2 effective: <input type="checkbox"/></td> <td>Setpoint percent 2 effective: <input type="checkbox"/></td> <td>Setpoint value 2 effective: <input type="checkbox"/></td> </tr> </table> <p>With setpoint adjustment: <input checked="" type="checkbox"/> Effective <input type="checkbox"/> Offset              With setpoint adjustment: <input checked="" type="checkbox"/> Effective <input type="checkbox"/> Offset              With setpoint adjustment: <input checked="" type="checkbox"/> Effective <input type="checkbox"/> Offset</p>				Setpoint temperature 1 offset: <input checked="" type="checkbox"/>	Setpoint percent 1 offset: <input type="checkbox"/>	Setpoint value 1 offset: <input type="checkbox"/>	Setpoint temperature 1 effective: <input checked="" type="checkbox"/>	Setpoint percent 1 effective: <input type="checkbox"/>	Setpoint value 1 effective: <input type="checkbox"/>	Setpoint temperature 2 offset: <input type="checkbox"/>	Setpoint percent 2 offset: <input type="checkbox"/>	Setpoint value 2 offset: <input type="checkbox"/>	Setpoint temperature 2 effective: <input type="checkbox"/>	Setpoint percent 2 effective: <input type="checkbox"/>	Setpoint value 2 effective: <input type="checkbox"/>
Setpoint temperature 1 offset: <input checked="" type="checkbox"/>	Setpoint percent 1 offset: <input type="checkbox"/>	Setpoint value 1 offset: <input type="checkbox"/>													
Setpoint temperature 1 effective: <input checked="" type="checkbox"/>	Setpoint percent 1 effective: <input type="checkbox"/>	Setpoint value 1 effective: <input type="checkbox"/>													
Setpoint temperature 2 offset: <input type="checkbox"/>	Setpoint percent 2 offset: <input type="checkbox"/>	Setpoint value 2 offset: <input type="checkbox"/>													
Setpoint temperature 2 effective: <input type="checkbox"/>	Setpoint percent 2 effective: <input type="checkbox"/>	Setpoint value 2 effective: <input type="checkbox"/>													
Error Message: MB_NO_ERROR			<input type="button" value="Readout"/> <input type="button" value="Write"/>												

### 4. Button configuration (Buttons)

General	Setpoint	Display	Buttons
Button configuration			
Function button		Function LED	
T 1:	<input type="text" value="default_value"/>	<input type="checkbox"/>	Ext. triggering LED button
T 2:	<input type="text" value="default_value"/>	<input type="checkbox"/>	Ext. triggering LED button
T 3:	<input type="text" value="default_value"/>	<input type="checkbox"/>	Ext. triggering LED button
T 4:	<input type="text" value="default_value"/>	<input type="checkbox"/>	Ext. triggering LED button
T 5:	<input type="text" value="Fan_stage_Minus_with_AUTO"/>	<input type="checkbox"/>	Ext. triggering LED button
T 6:	<input type="text" value="Fan_stage_Plus_with_AUTO"/>	<input type="checkbox"/>	Ext. triggering LED button
T 7:	<input type="text" value="Set_temperature_1_Minus"/>	<input type="checkbox"/>	Ext. triggering LED button
T 8:	<input type="text" value="Set_temperature_1_Plus"/>	<input type="checkbox"/>	Ext. triggering LED button
T 9:	<input type="text" value="Percent_value_2_Minus"/>	<input type="checkbox"/>	Ext. triggering LED button
T 10:	<input type="text" value="Percent_value_2_Plus"/>	<input type="checkbox"/>	Ext. triggering LED button
T 11:	<input type="text" value="default_value"/>	<input type="checkbox"/>	Ext. triggering LED button
T 12:	<input type="text" value="default_value"/>	<input type="checkbox"/>	Ext. triggering LED button

<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="border: 1px solid black; width: 20px; height: 15px; text-align: center;">T 1</td> <td style="border: 1px solid black; width: 20px; height: 15px; text-align: center;">T 2</td> <td style="border: 1px solid black; width: 20px; height: 15px; text-align: center;">T 3</td> <td style="border: 1px solid black; width: 20px; height: 15px; text-align: center;">T 4</td> </tr> </table>	T 1	T 2	T 3	T 4				
T 1	T 2	T 3	T 4					
<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="border: 1px solid black; width: 30px; height: 15px; text-align: center;">T 5</td> <td style="border: 1px solid black; width: 30px; height: 15px; text-align: center;">T 6</td> </tr> <tr> <td style="border: 1px solid black; width: 30px; height: 15px; text-align: center;">T 7</td> <td style="border: 1px solid black; width: 30px; height: 15px; text-align: center;">T 8</td> </tr> <tr> <td style="border: 1px solid black; width: 30px; height: 15px; text-align: center;">T 9</td> <td style="border: 1px solid black; width: 30px; height: 15px; text-align: center;">T 10</td> </tr> <tr> <td style="border: 1px solid black; width: 30px; height: 15px; text-align: center;">T 11</td> <td style="border: 1px solid black; width: 30px; height: 15px; text-align: center;">T 12</td> </tr> </table>	T 5	T 6	T 7	T 8	T 9	T 10	T 11	T 12
T 5	T 6							
T 7	T 8							
T 9	T 10							
T 11	T 12							

Error Message: MB\_NO\_ERROR



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