Tigo®

Please read these instructions carefully before installing

This will ensure an easy start and a great first customer experience with Smart Modules or optimizers installation

INTERACTIVE

INSTALLATION AND SAFETY MANUAL
FOR SMART MODULES OPTIMIZED BY TIGO®
J-ES AND TIGO MODULE MAXIMIZERs ES and 2ES

CLICK TO CONTINUE ▶

It is highly recommended to view in full screen mode

THE INTERACTIVE MANUAL

This manual contains action buttons, designated to help you navigate around and find the most relevant information for your installation

Next   Goes to the next page

Back   Goes to the previous page

Home   Goes to the product selection page

CLICK TO CONTINUE

READ THIS FIRST

IMPORTANT SAFETY INSTRUCTIONS

SAVE THESE INSTRUCTIONS

LETHAL VOLTAGE MAY BE PRESENT IN ANY PV INSTALLATION

- This manual contains important instructions for installation and maintenance of the Tigo Energy® product models MM-ES050V300W, MM-ES075V350W, MM-ES110V300W, MM-ES170V300W, MM-2ES050V300W, MM-2ES075V350W, MMJ-ES050V300W, HBF-ES050300W, TS4-L, TS4-O, TS4-S, TS4-M, ES-GTWY-020, MMU-ES, Cloud Connect and related Tigo Energy software applications.

- Risk of electric shock, do not remove cover, disassemble, or repair, no user serviceable parts inside. Refer servicing to qualified service personnel.

- Before installing or using the Tigo Energy® System, please read all instructions and warning markings on the Tigo Energy products, appropriate sections of your inverter manual, photovoltaic (PV) module installation manual, and other available safety guides.

- Failure to adhere to these instructions may result in injury or death, damage to the system or voiding the factory warranty.

- To reduce risk of fire and shock hazard, install this device with strict adherence to National Electric Code (NEC) ANSI/NFPA 70 and/or local electrical codes. When the photovoltaic array is exposed to light, it supplies a DC voltage to the Tigo Energy® Module Maximizer™. The Module Maximizers and Smart Modules start in the "ON" state and their output voltage may be as high as the PV module open circuit voltage (Voc) when connected to the module. The installer should use the same caution when handling electrical cables from a PV module with or without the Tigo Energy Module Maximizer attached.

- Installation must be performed by trained professionals only. Tigo Energy does not assume liability for loss or damage resulting from improper handling, installation, or misuse of products.

- Remove all metallic jewelry prior to installing the Tigo Energy Module Maximizers or Smart Modules to reduce the risk of contacting live circuitry. Do not attempt to install in inclement weather.

- Do not operate the Tigo Energy Module Maximizers or Smart Modules if it has been physically damaged. Check existing cables and connectors, ensuring they are in good condition and appropriate in rating. Do not operate the Tigo Energy Module Maximizer or Smart Module with damaged or substandard wiring or connectors. Tigo Energy Module Maximizer must be mounted on the high end of the PV module back-sheet or racking system, and in any case above ground.

- Do not connect or disconnect under load. Turning off the Inverter and/or the Tigo Energy products may not reduce this risk. Internal capacitors within the inverter can remain charged for several minutes after disconnecting all power sources. Verify capacitors have discharged by measuring voltage across inverter terminals prior to disconnecting wiring if service is required.

- Service Personnel: Check the voltage of the array after activating the Tigo Energy® PV-Safe™ function on the MMU prior to performing service.

- Always assume Module Maximizers and Smart Modules are in "ON" state, or may turn on when restarting.

PRODUCT SELECTION

Click on the picture to select your module level electronics:

Smart Module

Retrofit Product: MM-2ES

Retired Retrofit Product: MM-ES*

*MM-ES doesn't support all newest PV-Safe features

PRODUCT SELECTION

Click on the picture to select your Tigo control unit:

Cloud Connect

Management Unit (MMU)

TABLE OF CONTENTS

1. SYSTEM OVERVIEW

Gateway (GTWY)

To Next Gateway

Internet

Inverter

Management Unit
(MMU)

Tigo's Monitoring
Software for
Systems
Management

Smart Module
Powered by Tigo

2. INSTALLING THE MANAGEMENT UNIT (MMU)

WHERE TO PLACE?

Wall or beam | Near inverter

Inverter

3 Connections

① Internet Connection

② Electrical outlet 100-240V

Ethernet

7.36" (18.7cm)
8.05" (20.5cm)

8.6" (20.6cm)
8.7" (22.1cm)

MENU

TIGO Energy™ PV-SAFE
USE IN CASE OF EMERGENCY

Tigo Energy®
PV-SAFE

Go Back | MENU | ▼ | ▲ | ENTER | Move Forward | PHOTOVOLTAIC SYSTEM EQUIPPED WITH RAPID SHUTDOWN

Accessories Terminal | Gateway Terminal

G + • N/A | • + B A

Power Connector

Ethernet Jack

GTWY cable

③ RS485 type

GTWY

2. Control
  2.1 Discovery
  2.2 Modules ON
  2.5 GTWY Test
3. Network
  3.2 Test
(For a complete menu, see 7. Commissioning)

Plug in terminal after all GTWY(s) are connected (section 3, Installing GTWYs)

> More on RS485 in 3. Installing GTWYs
> Complete MMU menu in 7. Commissioning

④ **DONE?**
Perform Network Test: 3.2 on MMU menu

For Rapid Shutdown it is required that the MMU be installed on the same AC panel as the inverter.

CLICK HERE for a detailed MMU hardware guide

3. INSTALLING GATEWAYS (GTWY)

①

Run a wire from the MMU to the first GTWY

②

Place on back of PV module or Racking system

In center of sub-array

3/8" (0.952 cm)

Last GTWY or single GTWY installation

Sub-array 1 (back) Sub-array 2 Last sub-array

GTWY

50ft (15m)

Connection to next GTWY (remove resistor first)

120 Ω

finger tight only

Inbound from MMU/previous GTWY connection

RS485 maximum cable length in ft. (m)

AWG (mm²)	1 Gateway	2 Gateways	3 Gateways	4 Gateways	5 Gateways	6 Gateways	7 Gateways
18 (0.82)	2,604 (793)	2,604 (793)	1,817 (553)	1,363 (415)	1,090 (332)	908 (276)	716 (218)
20 (0.52)	2,604 (793)	1,714 (522)	1,143 (348)	857 (261)	686 (209)	571 (174)	456 (138)
22 (0.33)	2,156 (657)	1,078 (328)	719 (219)	539 (164)	431 (131)	359 (109)	287 (87)
CAT 5/6	4,067 (1,239)	2,034 (619)	1,356 (413)	1,017 (309)	813 (247)	678 (206)	543 (165)

Standard communication cable: type PLTC, 2 twisted pair, sunlight resistant or direct bury**

DONE? Connect terminal in MMU
Perform GTWY Test: 2.5 on MMU menu

③

CLICK HERE for a detailed Gateway hardware guide,
**CLICK HERE for CAT 5/6 wiring instructions

4. MAPPING

1

Remove 1 barcode sticker from the Tigo junction box.

2

Place the sticker on the map, string list or construction drawing, in the exact position you are going to place modules in the field or on the roof.

Place PV modules in a way matches the map you made using barcodes.

3

Also record the serial numbers of the GTWY(s) and MMU(s)

NOTE:

The PV module barcode or serial number doesn't apply for module level monitoring at the moment. MAKE SURE you take the junction box's label, NOT the module's

5. CONFIGURE THE SYSTEM ONLINE

1

CLICK HERE
http://installations.tigoenergy.com/

2

3 Follow the wizard instructions

Click on

New Installation

6. STRING SIZING

String Sizing with Smart Modules

MM-JES Smart Modules have a state of the art technology designed to reduce balance of system costs by allowing longer strings. This can reduce the number of strings by 30%, which directly correlates to a 30% reduction in combiner boxes, wiring, fuses, and hardware overhead costs, as well as reducing the labor requirement for installation.

Traditional String Design:

Max. string Voc	÷	Temp corrected Voc	=	# of modules per string

Example Calculation:

Max. Voc for code: 600V
Inverter VMPP range: 250-550V
Module Voc: 40V
Module Vmp: 32V
Temp. Corrected Voc: 40 * 1.25 = 50V
Max. string: 600V ÷ 50V = **12 modules**

From the example above: 550V ÷ 32V = **17 modules per string.** Verify string Vmp limits by dividing inverter max MPP voltage range by the Smart Module's Vmp.

Smart Module String Design:

Max. string Voc	÷	Reduced Voc	=	# of modules per string

Max. Voc for code: 600V
Inverter VMPP range: 250-550V
Reduced Voc: **34V**
Module Vmp: 32V
Temp. Corrected Voc: 34V * 1 = 34V
Max. string: 600V ÷ 34V = **17 modules**

Verify Maximum String Length:

Inverter MPP Voltage Max	÷	Vmp	=	# of modules per string

In Case of discrepancy between the Code requirement and the inverter voltage requirement pick the lower number of the two.

This example shows us a 33% increase in string power and Vmp, with a corresponding reduction in electrical BOS costs.

RAPID SHUTDOWN

Rapid Shutdown Compliance

MM-JES with MMU and Gateway are a solution to meet NEC 2014 690.12 Rapid Shutdown requirements, when combined with a DC disconnect at the inverter.

When Rapid Shutdown is initiated, the voltage across PV conductors will drop below 30V within 10 seconds at the module level

Rapid Shutdown is activated by taking 2 simple actions:

In the MMU box you'll find 2 red labels to mark the Rapid Shutdown equipment. Place one sticker next to the inverter's DC switch and the other on the AC breaker that can switch both inverter and MMU off **Both labels must be visible!**

Only a Properly installed, configured and tested system will perform Rapid Shutdown properly

To activate Rapid Shutdown*:

1. Switch off main AC, so that both inverter and MMU lose power simultaneously**

2. For non-RSS inverter, switch off DC disconnect as well

* There's no importance to the order in which the actions are taken

** Reminder: install MMU on same AC service as the inverter

7. COMMISSIONING

To commission the Tigo equipment there are 3 simple steps that need to be completed:

1. NETWORK TEST
2. GATEWAY TEST
3. DISCOVERY

For systems with multiple MMUs, these tests need to be performed to each individual MMU.

Network and Gateway tests can run at the same time on different MMUs. However, discovery must be initiated on MMUs one by one, making sure GTWY discovery stage is complete before moving to the next MMU.

This may take several minutes to several hours depending on the size of the system.

Note: The discovery process can be initiated only after the online configuration of the system has been completed and downloaded by the MMU. Requires an Internet connection.

VERIFY RAPID SHUTDOWN FUNCTIONALITY

Verify rapid shutdown functionality after the discovery process is completed.

Switch off AC main and make sure voltage drops below 30V within 10 seconds. Power the system on after testing using:

2. Control -> 2.2. Modules ON

MMU MENU:

1. Status
    1.1. Modules
        1.1.1. Signal
        1.1.2. Voltage
        1.1.3. Power
    1.2. Date / Time
    1.3. Unit ID
    1.4.Version
    1.5. Config (internal use only)
2. Control
    2.1. Discovery
    2.2. Modules ON
    2.3. Push Data
    2.4. Restart
    2.5. Gateway Test
    2.6. Replace GW
    2.7. H/W Test (internal use only)
3. Network
    3.1. Display IP
    3.2. Test
    3.3. Configure
    3.4. Set Proxy
    3.5. Renew

8. CONNECTING MODBUS DEVICES (OPTIONAL)

1

AC meter
or
inverter
installation
manual

2

GND	DATA +	DATA -	N/A

TIGO Energy™ PV-SAFE
USE IN CASE OF

MENU ▼ ▲ ENTER

Accessories Terminal
G + - N/A

Gateway Terminal
- + B A

Tigo Tech Support
1.408.402.0802 ext 2
00800.CALL.TIGO(2255.8446)

3

Modbus device B

Modbus device A

To GTWY

Series connection for multiple similar devices

Recommended settings:
- 9600 baud rate
- 8 bits data
- 1 stop bit
- No parity

TECHNICAL SPECIFICATIONS

Electrical Specifications							
Data	MM-2ES50 (per input)	MM-2ES75 (per input)	MMJ-ES50 / HBF-ES50 / TS4-L**	MM-ES50	MM-ES75	MM-ES110	MM-ES170
Maximum power	375W	375W	375W	300W	300W	300W	300W
Maximum VDC (Voc)	52V	75V	52V	52V	75V	110V	170V
Vmp range	16-48V	30-65V	16-48V	16-48V	30-65V	30-89V	30-140V
Maximum current (Isc)	10A	7.5A	10A	10A	7.5A	5A	3A
Maximum Imp	9.5A	6.5A	9.5A	9.5A	6.5A	4.7A	2.6A
Series fuse rating	15A	10A	15A	15A	10A	10A	10A

Mechanical Specifications				
Dimensions 2ES, Gateway*	120 x 104 x 25 mm	Dimensions JES*	171 x 155 x 22 mm	Dimensions MMU*	226 x 226 x 125 mm
Dimensions CC*	160 x 90 x 58 mm	Standard (ST) output cable length	1.3 m	XL output cable length	2.1 m
Maximizer output cable & connector	PV wire 12 AWG 4mm², MC4	Tyco SOLARLOCK: Tigo Positive input accepts Tyco male (+) or neutral keying. Tigo Negative accepts female (+) or (-) keying. Do not connect any other type.			

Environmental Specifications				
Operating temperature 2ES, GTWY	-30°C to + 70°C	Operating temperature J-ES / HBF	-40°C to + 85°C	Operating temperature MMU	0°C to + 70°C
Operating temperature CC	-20°C to + 70°C	Operating temperature CC socket power supply	0°C to + 45°C	Operating temperature CC din rail power supply	-20°C to + 60°C

Optimizers: NEMA 3R, IP65, OVPIII, UV-F1/UL 94-5VA		MMU: Class 4K 4H (per EN 50187)	
Connection MMU to the internet	Ethernet	MMU Power supply rating	24Vdc 1A
Power consumption MMU	2.5W	Power consumption Gateway	0.5W
Power consumption CC	>4W	Connection CC to the internet	Ethernet or WiFi

*Dimensions are without mounting accessories or cables. Please refer to drawings in datasheets for more accurate information.

** Different product names refer to different mechanical enclosures

TABLE OF CONTENTS

PHOTOVOLTAIC SYSTEM EQUIPPED WITH RAPID SHUTDOWN

1. SYSTEM OVERVIEW

Gateway (GTWY)

To Next Gateway

Internet

Inverter

Cloud Connect (CC)

Smart Module Powered by Tigo

Tigo's Monitoring Software for Systems Management

2. INSTALLING THE CLOUD CONNECT (CC)

OPTIONAL
Emergency Push Button

Wired **Ethernet**
connection option

1

90.2mm (3.55")

159.5mm (6.28")

- +

USB Host

I/O
- +

Ethernet

PV 2.0

Cloud Connect

MENU   ENTER

Tigo®

PV SAFE

Wi-Fi Antenna

Optional
⏚ ■ B A

Gateways
- + B A

Input 24VDC
- - + +

G ■ B A   - + B A   - - + +

57.5mm (2.26")

OPTIONAL
For 3rd party devices

Power Supply
24Vdc input

2

OPTIONAL
Wi-Fi Antenna*
As an internet connection and / or for commissioning with a Smart Phone

Gateway
Plug in GTWY(s) cable after all the GTWY(s) are connected in series (next page)

3

For Rapid Shutdown, install CC on the same AC panel as the inverter

*In case CC is mounted in a metal enclosure, extend this antenna out of the box in order to use Wi-Fi as an internet connection

---

WHERE TO PLACE:

- On a wall or beam

- Next to the inverter

- Out of direct sunlight

3 CONNECTIONS:

1. Internet connection, using one of the options:

   • Ethernet Port

   • Built in Wi-Fi

     • Wi-Fi connection is configured using the Tigo SMART app

2. Power supply: 2 options:

   • DIN Rail Power Supply

   • Wall Socket Power Supply

   • CLICK HERE for details

3. GTWY

   • More on RS485 cables in the next page

Complete CC menu options in 7. Commissioning

CLICK HERE for Tigo SMART app guide

POWER SUPPLY OPTIONS

Wall Outlet Plug		Din Rail	
Tigo Power supply only P/N	983-00070-00	Tigo Power supply only P/N	983-00054-00
Tigo CC Kit P/N	333-00000-10	Tigo CC Kit P/N	333-00000-00
Manufacturer, P/N	Click, CPS024240100*	Manufacturer, P/N	Mean Well, DR-15-24
Input	85-264VAC 47Hz-63Hz	Input	100-240VAC 50Hz/60Hz
Output	24VDC 0.63A	Output	24VDC 1A
Temperature rating	0°C to +45°C	Temperature rating	-20°C to +60°C

3. INSTALLING GATEWAYS (GTWY)

1 Run a wire from the Cloud Connect (CC) to the first GTWY

2 Place on back of PV module or Racking system

In center of sub-array

3/8" (0.952 cm)

Last GTWY or single GTWY installation

Sub-array 1 (back) Sub-array 2 Last sub-array

GTWY

50ft (15m)

Connection to next GTWY (remove resistor first)

120 Ω

finger tight only

Inbound from CC / previous GTWY connection

Standard communication cable: type PLTC, 2 twisted pair, sunlight resistant or direct bury**

RS485 maximum cable length in ft. (m)

AWG (mm²)	1 Gateway	2 Gateways	3 Gateways	4 Gateways	5 Gateways	6 Gateways	7 Gateways
18 (0.82)	2,604 (793)	2,604 (793)	1,817 (553)	1,363 (415)	1,090 (332)	908 (276)	716 (218)
20 (0.52)	2,604 (793)	1,714 (522)	1,143 (348)	857 (261)	686 (209)	571 (174)	456 (138)
22 (0.33)	2,156 (657)	1,078 (328)	719 (219)	539 (164)	431 (131)	359 (109)	287 (87)
CAT 5/6	4,067 (1,239)	2,034 (619)	1,356 (413)	1,017 (309)	813 (247)	678 (206)	543 (165)

DONE? Connect terminal in CC
Perform GTWY Test: 2.5 on CC menu

3

CLICK HERE for a detailed Gateway hardware guide,
**CLICK HERE for CAT 5/6 wiring instructions

4. MAPPING

1

Remove 1 barcode sticker from the Tigo junction box.

2

Place the sticker on the map, string list or construction drawing, in the exact position you are going to place modules in the field or on the roof.

Place PV modules in a way matches the map you made using barcodes.

3

Also record the serial numbers of the GTWY(s) and MMU(s)

5. CONFIGURE THE SYSTEM ONLINE

1

CLICK HERE
http://installations.tigoenergy.com/

Option 1 — New User

Option 2 — Returning User

3 Follow the wizard instructions

Click on
New Installation

2

6. STRING SIZING

String Sizing with Smart Modules

MM-JES Smart Modules have a state of the art technology designed to reduce balance of system costs by allowing longer strings. This can reduce the number of strings by 30%, which directly correlates to a 30% reduction in combiner boxes, wiring, fuses, and hardware overhead costs, as well as reducing the labor requirement for installation.

Traditional String Design:

Max. string Voc	÷	Temp corrected Voc	=	# of modules per string

Example Calculation:

Max. Voc for code: 600V
Inverter VMPP range: 250-550V
Module Voc: 40V
Module Vmp: 32V
Temp. Corrected Voc: 40 * 1.25 = 50V
Max. string: 600V ÷ 50V = **12 modules**

From the example above: 550V ÷ 32V = **17 modules per string.** Verify string Vmp limits by dividing inverter max MPP voltage range by the Smart Module's Vmp.

Smart Module String Design:

Max. string Voc	÷	Reduced Voc	=	# of modules per string

Max. Voc for code: 600V
Inverter VMPP range: 250-550V
Reduced Voc: **34V**
Module Vmp: 32V
Temp. Corrected Voc: 34V * 1 = 34V
Max. string: 600V ÷ 34V = **17 modules**

Verify Maximum String Length:

Inverter MPP Voltage Max	÷	Vmp	=	# of modules per string

In Case of discrepancy between the Code requirement and the inverter voltage requirement pick the lower number of the two.

This example shows us a 33% increase in string power and Vmp, with a corresponding reduction in electrical BOS costs.

RAPID SHUTDOWN

Rapid Shutdown Compliance

MM-JES with CC and Gateway are a solution to meet NEC 2014 690.12 Rapid Shutdown requirements, when combined with a DC disconnect at the inverter.

When Rapid Shutdown is initiated, the voltage across PV conductors will drop below 30V within 10 seconds at the module level

Rapid Shutdown is activated by taking 2 simple actions:

In the CC box you'll find 2 red labels to mark the Rapid Shutdown equipment. Place one sticker next to the inverter's DC switch and the other on the AC breaker that can switch both inverter and CC off **Both labels must be visible!**

Only a Properly installed, configured and tested system will perform Rapid Shutdown properly

To activate Rapid Shutdown*:

1. Switch off main AC, so that both inverter and CC lose power simultaneously**

2. For non-RSS inverter, switch off DC disconnect as well

* There's no importance to the order in which the actions are taken

** Reminder: install CC on same AC service as the inverter

7. COMMISSIONING

To commission the Tigo equipment there are 3 simple steps that need to be completed:

1. NETWORK TEST
2. GATEWAY TEST
3. DISCOVERY

For systems with multiple Cloud Connect units, these tests need to be performed to each individual CC.

Network and Gateway tests can run at the same time on different CCs. However, discovery must be initiated on CCs one by one, making sure GTWY discovery stage is complete before moving to the next CC.

This may take several minutes to several hours depending on the size of the system.

Note: The discovery process can be initiated for sites with more than 50 Smart Modules only after the online configuration of the system has been completed and downloaded by the CC. This step requires an Internet connection.

To Commission the system using your Smart Phone, download the Tigo SMART app and follow its instructions. CLICK HERE to see a manual

VERIFY RAPID SHUTDOWN FUNCTIONALITY

Verify rapid shutdown functionality after the discovery process is completed.

Switch off the AC main and make sure voltage drops below 30V within 10 seconds. Power the system on after testing using:

2. Control -> 2.2. Modules ON

CC MENU:

1. Status
    - 1.1. Modules
        - 1.1.1. Signal
        - 1.1.2. Voltage
        - 1.1.3. Power
    - 1.2. Date / Time
    - 1.3. Unit ID
    - 1.4. Version
    - 1.5. Config (internal use only)
2. Control
    - 2.1. Discovery
    - 2.2. Modules ON
    - 2.3. Push Data
    - 2.4. Restart
    - 2.5. Gateway Test
    - 2.6. Replace GW
    - 2.7. H/W Test (internal use only)
3. Network
    - 3.1. Display IP
    - 3.2. Test
    - 3.3. Configure
    - 3.4. Set Proxy
    - 3.5. Renew

Click for description

8. CONNECTING MODBUS DEVICES (OPTIONAL)

USB Host

I/O
- +

Ethernet

PV 2.0 Cloud Connect Tigo

MENU ENTER

PV SAFE

Wi-Fi Antenna

Optional
+ ■ B A

Gateways
- + B A

Input 24VDC
- - + +

G ■ B A

To GTWY

AC meter or inverter installation manual

Tigo Tech Support
1.408.402.0802 ext 2
00800.CALL.TIGO(2255.8446)

Modbus device B

Modbus device A

Series connection for multiple similar devices

Recommended settings:
- 9600 baud rate
- 8 bits data
- 1 stop bit
- No parity

TECHNICAL SPECIFICATIONS

Electrical Specifications							
Data	MM-2ES50 (per input)	MM-2ES75 (per input)	MMJ-ES50 / HBF-ES50 / TS4-L**	MM-ES50	MM-ES75	MM-ES110	MM-ES170
Maximum power	375W	375W	375W	300W	300W	300W	300W
Maximum VDC (Voc)	52V	75V	52V	52V	75V	110V	170V
Vmp range	16-48V	30-65V	16-48V	16-48V	30-65V	30-89V	30-140V
Maximum current (Isc)	10A	7.5A	10A	10A	7.5A	5A	3A
Maximum Imp	9.5A	6.5A	9.5A	9.5A	6.5A	4.7A	2.6A
Series fuse rating	15A	10A	15A	15A	10A	10A	10A

Mechanical Specifications					
Dimensions 2ES, Gateway*	120 x 104 x 25 mm	Dimensions JES*	171 x 155 x 22 mm	Dimensions MMU*	226 x 226 x 125 mm
Dimensions CC*	160 x 90 x 58 mm	Standard (ST) output cable length	1.3 m	XL output cable length	2.1 m
Maximizer output cable & connector	PV wire 12 AWG 4mm², MC4	Tyco SOLARLOCK: Tigo Positive input accepts Tyco male (+) or neutral keying. Tigo Negative accepts female (+) or (-) keying. Do not connect any other type.			

Environmental Specifications					
Operating temperature 2ES, GTWY	-30°C to + 70°C	Operating temperature J-ES / HBF	-40°C to + 85°C	Operating temperature MMU	0°C to + 70°C
Operating temperature CC	-20°C to + 70°C	Operating temperature CC socket power supply	0°C to + 45°C	Operating temperature CC din rail power supply	-20°C to + 60°C

Optimizers: NEMA 3R, IP65, OVPIII, UV-F1/UL 94-5VA		MMU: Class 4K 4H (per EN 50187)	
Connection MMU to the internet	Ethernet	MMU Power supply rating	24Vdc 1A
Power consumption MMU	2.5W	Power consumption Gateway	0.5W
Power consumption CC	>4W	Connection CC to the internet	Ethernet or WiFi

*Dimensions are without mounting accessories or cables. Please refer to drawings in datasheets for more accurate information.

** Different product names refer to different mechanical enclosures

PRODUCT SELECTION

Click on the picture to select your Tigo control unit:

Cloud Connect

Management Unit (MMU)

TABLE OF CONTENTS

1. SYSTEM OVERVIEW

Max 56" (142 cm)

Gateway (GTWY)

Inverter

Management Unit
(MMU)

To Next
Gateway

Internet

MM-ES
Optimizer

Tigo's Monitoring
Software for
Systems
Management

DESIGN RULES:

1 MMU:

- Up to 7 GTWYs and 360 PV modules

- All PV modules in the same string
  must be assigned to the same MMU

1 GTWY:

- Up to 120 PV modules

- Modules must be within 10m-15m
  (33-50 ft.) from the GW, depending on
  roof topology

For further information CLICK HERE

MMU AND GTWY CALCULATOR:

For the number of MMUs and
GTWYs required for your project
CLICK HERE

2. INSTALLING THE MANAGEMENT UNIT (MMU)

WHERE TO PLACE?

Wall or beam   **Near inverter**

Inverter

3 Connections

7.36" (18.7cm)
8.05" (20.5cm)

8.6" (20.6cm)
8.7" (22.1cm)

MENU

TIGO Energy™ PV-SAFE
USE IN CASE OF EMERGENCY

Go Back   MENU   ▼   ▲   ENTER   Move Forward   PHOTOVOLTAIC SYSTEM EQUIPPED WITH RAPID SHUTDOWN

Tigo Energy® **PV-SAFE**

Accessories Terminal   Gateway Terminal
G + • N/A   • + B A

2. Control
  2.1 Discovery
  2.2 Modules ON
  2.5 GTWY Test
3. Network
  3.2 Test
(For a complete menu, see 7. Commissioning)

Plug in terminal after all GTWY(s) are connected (section 3, Installing GTWYs)

GTWY

(1) Internet Connection

(2) Ethernet   🔌

Power Connector

Ethernet Jack

GTWY cable

(3)

RS485 type

Electrical outlet 100-240V

> More on RS485 in 3. Installing GTWYs
> Complete MMU menu in 7. Commissioning

For Rapid Shutdown, install the MMU on the same AC panel as the inverter

(4) **DONE?**
Perform Network Test: 3.2 on MMU menu

3. INSTALLING GATEWAYS (GTWY)

1

Run a wire from the MMU to the first GTWY

2

Place on back of PV module or Racking system

In center of sub-array

3/8" (0.952 cm)

Last GTWY or single GTWY installation

Sub-array 1 (back) Sub-array 2 Last sub-array

GTWY

50ft (15m)

Connection to next GTWY (remove resistor first)

120 Ω

finger tight only

Inbound from MMU/previous GTWY connection

RS485 maximum cable length in ft. (m)

AWG (mm²)	1 Gateway	2 Gateways	3 Gateways	4 Gateways	5 Gateways	6 Gateways	7 Gateways
18 (0.82)	2,604 (793)	2,604 (793)	1,817 (553)	1,363 (415)	1,090 (332)	908 (276)	716 (218)
20 (0.52)	2,604 (793)	1,714 (522)	1,143 (348)	857 (261)	686 (209)	571 (174)	456 (138)
22 (0.33)	2,156 (657)	1,078 (328)	719 (219)	539 (164)	431 (131)	359 (109)	287 (87)
CAT 5/6	4,067 (1,239)	2,034 (619)	1,356 (413)	1,017 (309)	813 (247)	678 (206)	543 (165)

Standard communication cable: type PLTC, 2 twisted pair, sunlight resistant or direct bury**

DONE? Connect terminal in MMU
Perform GTWY Test: 2.5 on MMU menu

3

CLICK HERE for a detailed Gateway hardware guide,
**CLICK HERE for CAT 5/6 wiring instructions

4. MAPPING

① ②

Take out optimizers & remove 1 barcode sticker. Place the sticker on the map, string list, or construction drawing to match the physical location of the optimizer

NOTE:

The PV module barcode or serial number doesn't apply for module level monitoring at the moment. MAKE SURE you take the optimizer label, NOT the module's

5. CONFIGURE THE SYSTEM ONLINE

1

CLICK HERE
http://installations.tigoenergy.com/

Option 1 — New User

Option 2 — Returning User

3 Follow the wizard instructions

Click on
New Installation

2

6. INSTALLING THE OPTIMIZERS

1 Mount the optimizer on the top right corner of the module

Max 56" (142 cm)

Use the string list template or map, to keep track of optimizer placement. This is important for the physical positioning view in the monitoring software, which will greatly help in the future for O&M

2 Place PV modules and optimizers in a way matches the map you made using barcodes.

Inverter

3 Also record the serial numbers of the GTWY(s) and MMU(s)

7. COMMISSIONING

To commission the Tigo equipment there are 3 simple steps that need to be completed:

1. NETWORK TEST
2. GATEWAY TEST
3. DISCOVERY

For systems with multiple MMUs, these tests need to be performed to each individual MMU.

Network and Gateway tests can run at the same time on different MMUs. However, discovery must be initiated on MMUs one by one, making sure GTWY discovery stage is complete before moving to the next MMU.

This may take several minutes to several hours depending on the size of the system.

Note: The discovery process can be initiated only after the online configuration of the system has been completed and downloaded by the MMU. Requires an Internet connection.

8. CONNECTING MODBUS DEVICES (OPTIONAL)

1

AC meter or inverter installation manual

2

| GND | DATA + | DATA - | N/A |

Accessories Terminal
G + - N/A

Gateway Terminal
- + B A

Tigo Tech Support
1.408.402.0802 ext 2
00800.CALL.TIGO(2255.8446)

3

Modbus device B

Modbus device A

To GTWY

Series connection for multiple similar devices

Recommended settings:
• 9600 baud rate
• 8 bits data
• 1 stop bit
• No parity

TECHNICAL SPECIFICATIONS

Electrical Specifications							
Data	MM-2ES50 (per input)	MM-2ES75 (per input)	MMJ-ES50 / HBF-ES50 / TS4-L**	MM-ES50	MM-ES75	MM-ES110	MM-ES170
Maximum power	375W	375W	375W	300W	300W	300W	300W
Maximum VDC (Voc)	52V	75V	52V	52V	75V	110V	170V
Vmp range	16-48V	30-65V	16-48V	16-48V	30-65V	30-89V	30-140V
Maximum current (Isc)	10A	7.5A	10A	10A	7.5A	5A	3A
Maximum Imp	9.5A	6.5A	9.5A	9.5A	6.5A	4.7A	2.6A
Series fuse rating	15A	10A	15A	15A	10A	10A	10A

Mechanical Specifications				
Dimensions 2ES, Gateway*	120 x 104 x 25 mm	Dimensions JES*	171 x 155 x 22 mm	Dimensions MMU*	226 x 226 x 125 mm
Dimensions CC*	160 x 90 x 58 mm	Standard (ST) output cable length	1.3 m	XL output cable length	2.1 m
Maximizer output cable & connector	PV wire 12 AWG 4mm², MC4	Tyco SOLARLOCK: Tigo Positive input accepts Tyco male (+) or neutral keying. Tigo Negative accepts female (+) or (-) keying. Do not connect any other type.			

Environmental Specifications				
Operating temperature 2ES, GTWY	-30°C to + 70°C	Operating temperature J-ES / HBF	-40°C to + 85°C	Operating temperature MMU	0°C to + 70°C
Operating temperature CC	-20°C to + 70°C	Operating temperature CC socket power supply	0°C to + 45°C	Operating temperature CC din rail power supply	-20°C to + 60°C

Optimizers: NEMA 3R, IP65, OVPIII, UV-F1/UL 94-5VA		MMU: Class 4K 4H (per EN 50187)	
Connection MMU to the internet	Ethernet	MMU Power supply rating	24Vdc 1A
Power consumption MMU	2.5W	Power consumption Gateway	0.5W
Power consumption CC	>4W	Connection CC to the internet	Ethernet or WiFi

*Dimensions are without mounting accessories or cables. Please refer to drawings in datasheets for more accurate information.

** Different product names refer to different mechanical enclosures

TABLE OF CONTENTS

1. SYSTEM OVERVIEW

Max 56" (142 cm)

Gateway (GTWY)

To Next Gateway

Internet

Inverter

Cloud Connect (CC)

MM-ES Optimizer

Tigo's Monitoring Software for Systems Management

2. INSTALLING THE CLOUD CONNECT (CC)

OPTIONAL
Emergency Push Button

Wired **Ethernet**
connection option

1

90.2mm (3.55")

159.5mm (6.28")

USB Host — I/O — Ethernet

PV 2.0 Cloud Connect · **Tigo®**

MENU · ENTER

PV SAFE

Wi-Fi Antenna · Optional ⏚ ■ B A · Gateways - + B A · Input 24VDC - - + +

G ■ B A · - + B A · - - + +

57.5mm (2.26")

OPTIONAL
For 3rd party
devices

Power Supply
24Vdc input

2

OPTIONAL
Wi-Fi Antenna*
As an internet
connection and / or
for commissioning
with a Smart Phone

Gateway
Plug in GTWY(s)
cable after all the
GTWY(s) are
connected in
series (next page)

3

For Rapid Shutdown,
install CC on the same
AC panel as the
inverter

*In case CC is mounted in a metal enclosure, extend this antenna out of the box in order to use Wi-Fi as an internet connection

---

WHERE TO PLACE:

- On a wall or beam

- Next to the inverter

- Out of direct sunlight

3 CONNECTIONS:

1. Internet connection, using one of the options:

    • Ethernet Port

    • Built in Wi-Fi

        • Wi-Fi connection is configured using the Tigo SMART app

2. Power supply: 2 options:

    • DIN Rail Power Supply

    • Wall Socket Power Supply

    • CLICK HERE for details

3. GTWY

    • More on RS485 cables in the next page

Complete CC menu options in 7. Commissioning

CLICK HERE for Tigo SMART app guide

POWER SUPPLY OPTIONS

Wall Outlet Plug		Din Rail	
Tigo Power supply only P/N	983-00070-00	Tigo Power supply only P/N	983-00054-00
Tigo CC Kit P/N	333-00000-10	Tigo CC Kit P/N	333-00000-00
Manufacturer, P/N	Click, CPS024240100*	Manufacturer, P/N	Mean Well, DR-15-24
Input	85-264VAC 47Hz-63Hz	Input	100-240VAC 50Hz/60Hz
Output	24VDC 0.63A	Output	24VDC 1A
Temperature rating	0°C to +45°C	Temperature rating	-20°C to +60°C

3. INSTALLING GATEWAYS (GTWY)

① Run a wire from the Cloud Connect (CC) to the first GTWY

② Place on back of PV module or Racking system

In center of sub-array

3/8" (0.952 cm)

Last GTWY or single GTWY installation

Sub-array 1 (back)   Sub-array 2   Last sub-array

GTWY

50ft (15m)

Connection to next GTWY (remove resistor first)

120 Ω

finger tight only

Inbound from CC / previous GTWY connection

Standard communication cable: type PLTC, 2 twisted pair, sunlight resistant or direct bury**

RS485 maximum cable length in ft. (m)

AWG (mm²)	1 Gateway	2 Gateways	3 Gateways	4 Gateways	5 Gateways	6 Gateways	7 Gateways
18 (0.82)	2,604 (793)	2,604 (793)	1,817 (553)	1,363 (415)	1,090 (332)	908 (276)	716 (218)
20 (0.52)	2,604 (793)	1,714 (522)	1,143 (348)	857 (261)	686 (209)	571 (174)	456 (138)
22 (0.33)	2,156 (657)	1,078 (328)	719 (219)	539 (164)	431 (131)	359 (109)	287 (87)
CAT 5/6	4,067 (1,239)	2,034 (619)	1,356 (413)	1,017 (309)	813 (247)	678 (206)	543 (165)

DONE? Connect terminal in CC
Perform GTWY Test: 2.5 on CC menu

③

CLICK HERE for a detailed Gateway hardware guide,
**CLICK HERE for CAT 5/6 wiring instructions

4. MAPPING

1

2

Take out optimizers & remove 1 barcode sticker. Place the sticker on the map, string list, or construction drawing to match the physical location of the optimizer

NOTE:

The PV module barcode or serial number doesn't apply for module level monitoring at the moment. MAKE SURE you take the optimizer label, NOT the module's

5. CONFIGURE THE SYSTEM ONLINE

1

CLICK HERE
http://installations.tigoenergy.com/

3 Follow the wizard instructions

Click on

New Installation

2

6. INSTALLING THE OPTIMIZERS

1 Mount the optimizer on the top right corner of the module

Use the string list template or map, to keep track of optimizer placement. This is important for the physical positioning view in the monitoring software, which will greatly help in the future for O&M

Max 56" (142 cm)

2 Place PV modules and optimizers in a way matches the map you made using barcodes.

3 Also record the serial numbers of the GTWY(s) and MMU(s)

Inverter

7. COMMISSIONING

To commission the Tigo equipment there are 3 simple steps that need to be completed:

1. NETWORK TEST
2. GATEWAY TEST
3. DISCOVERY

For systems with multiple Cloud Connect units, these tests need to be performed to each individual CC.

Network and Gateway tests can run at the same time on different CCs. However, discovery must be initiated on CCs one by one, making sure GTWY discovery stage is complete before moving to the next CC.

This may take several minutes to several hours depending on the size of the system.

Note: The discovery process can be initiated only after the online configuration of the system has been completed and downloaded by the CC. Requires an Internet connection.

To Commission the system using your Smart Phone, download the Tigo SMART app and follow its instructions, CLICK HERE to see a manual.

8. CONNECTING MODBUS DEVICES (OPTIONAL)

1

AC meter
or
inverter
installation
manual

2

USB Host

I/O
- +

Ethernet

PV 2.0 Cloud Connect

MENU ENTER

Tigo

PV SAFE

Wi-Fi
Antenna

Optional
+ ■ B A

Gateways
- + B A

Input 24VDC
- - + +

G ■ B A

Tigo Tech Support
1.408.402.0802 ext 2
00800.CALL.TIGO(2255.8446)

3

To
GTWY

Modbus
device B

Modbus
device A

Series connection for
multiple similar devices

Recommended
settings:
• 9600 baud rate
• 8 bits data
• 1 stop bit
• No parity

TECHNICAL SPECIFICATIONS

Electrical Specifications							
Data	MM-2ES50 (per input)	MM-2ES75 (per input)	MMJ-ES50 / HBF-ES50 / TS4-L**	MM-ES50	MM-ES75	MM-ES110	MM-ES170
Maximum power	375W	375W	375W	300W	300W	300W	300W
Maximum VDC (Voc)	52V	75V	52V	52V	75V	110V	170V
Vmp range	16-48V	30-65V	16-48V	16-48V	30-65V	30-89V	30-140V
Maximum current (Isc)	10A	7.5A	10A	10A	7.5A	5A	3A
Maximum Imp	9.5A	6.5A	9.5A	9.5A	6.5A	4.7A	2.6A
Series fuse rating	15A	10A	15A	15A	10A	10A	10A

Mechanical Specifications					
Dimensions 2ES, Gateway*	120 x 104 x 25 mm	Dimensions JES*	171 x 155 x 22 mm	Dimensions MMU*	226 x 226 x 125 mm
Dimensions CC*	160 x 90 x 58 mm	Standard (ST) output cable length	1.3 m	XL output cable length	2.1 m
Maximizer output cable & connector	PV wire 12 AWG 4mm², MC4	Tyco SOLARLOCK: Tigo Positive input accepts Tyco male (+) or neutral keying. Tigo Negative accepts female (+) or (-) keying. Do not connect any other type.			

Environmental Specifications					
Operating temperature 2ES, GTWY	-30°C to + 70°C	Operating temperature J-ES / HBF	-40°C to + 85°C	Operating temperature MMU	0°C to + 70°C
Operating temperature CC	-20°C to + 70°C	Operating temperature CC socket power supply	0°C to + 45°C	Operating temperature CC din rail power supply	-20°C to + 60°C

Optimizers: NEMA 3R, IP65, OVPIII, UV-F1/UL 94-5VA		MMU: Class 4K 4H (per EN 50187)	
Connection MMU to the internet	Ethernet	MMU Power supply rating	24Vdc 1A
Power consumption MMU	2.5W	Power consumption Gateway	0.5W
Power consumption CC	>4W	Connection CC to the internet	Ethernet or WiFi

*Dimensions are without mounting accessories or cables. Please refer to drawings in datasheets for more accurate information.

** Different product names refer to different mechanical enclosures

CE FC VCI c US 247725 smart curve

PRODUCT SELECTION

Click on the picture to select your Tigo control unit:

Cloud Connect

Management Unit (MMU)

TABLE OF CONTENTS

1. SYSTEM OVERVIEW

Max 95" (241 cm)

2ES-ST
For portrait installations

2ES-XL
For landscape installations

Max 150" (380 cm)

Gateway
(GTWY)

To Next
Gateway

Internet

Inverter

Management Unit
(MMU)

MM-2ES
Optimizer

Tigo's Monitoring
Software for
Systems
Management

2. INSTALLING THE MANAGEMENT UNIT (MMU)

7.36" (18.7cm)

8.05" (20.5cm)

8.6" (20.6cm)

8.7" (22.1cm)

WHERE TO PLACE?

Wall or beam

Near inverter

Inverter

2. Control
  2.1 Discovery
  2.2 Modules ON
  2.5 GTWY Test
3. Network
  3.2 Test
(For a complete menu, see 7. Commissioning)

TIGO Energy™ PV-SAFE
USE IN CASE OF EMERGENCY

MENU

Go Back

MENU

▼

▲

ENTER

Move Forward

PHOTOVOLTAIC SYSTEM EQUIPPED WITH RAPID SHUTDOWN

Tigo Energy® **PV-SAFE**

Accessories Terminal

G + • N/A

Gateway Terminal

• + B A

Plug in terminal after all GTWY(s) are connected (section 3, Installing GTWYs)

3 Connections

Ethernet

GTWY

Power Connector

(1)

(2)

Internet Connection

Electrical outlet 100-240V

Ethernet Jack

GTWY cable

(3)

RS485 type

For Rapid Shutdown, install MMU on the same AC panel as the inverter

(4)

> More on RS485 in 3. Installing GTWYs
> Complete MMU menu in 7. Commissioning

DONE?
Perform Network Test: 3.2 on MMU menu

CLICK HERE for a detailed MMU hardware guide

3. INSTALLING GATEWAYS (GTWY)

① **Run a wire from the MMU to the first GTWY**

② **Place on back of PV module or Racking system**

In center of sub-array

3/8" (0.952 cm)

Last GTWY or single GTWY installation

Sub-array 1 (back)   Sub-array 2   Last sub-array

GTWY

50ft (15m)

Connection to next GTWY (remove resistor first)

120 Ω

finger tight only

Inbound from MMU/previous GTWY connection

RS485 maximum cable length in ft. (m)

AWG (mm²)	1 Gateway	2 Gateways	3 Gateways	4 Gateways	5 Gateways	6 Gateways	7 Gateways
18 (0.82)	2,604 (793)	2,604 (793)	1,817 (553)	1,363 (415)	1,090 (332)	908 (276)	716 (218)
20 (0.52)	2,604 (793)	1,714 (522)	1,143 (348)	857 (261)	686 (209)	571 (174)	456 (138)
22 (0.33)	2,156 (657)	1,078 (328)	719 (219)	539 (164)	431 (131)	359 (109)	287 (87)
CAT 5/6	4,067 (1,239)	2,034 (619)	1,356 (413)	1,017 (309)	813 (247)	678 (206)	543 (165)

Standard communication cable: type PLTC, 2 twisted pair, sunlight resistant or direct bury

DONE? Connect terminal in MMU
Perform GTWY Test: 2.5 on MMU menu

③

CLICK HERE for a detailed Gateway hardware guide,
**CLICK HERE for CAT 5/6 wiring instructions

4. MAPPING

Take out optimizers & remove 1 barcode sticker. Place the sticker on the map, string list, or construction drawing to match the physical location of the optimizer.

MM-2ES dual optimizer has one serial number for every two PV modules.

Assign barcodes only to first PV module in the pair. The second will be filled in automatically once you enter the barcodes online.

Also record the serial numbers of the MMUs and GTWYs.

NOTE:

The PV module barcode or serial number doesn't apply for module level monitoring at the moment. MAKE SURE you take the optimizer's label, NOT the module's

5. CONFIGURE THE SYSTEM ONLINE

1

CLICK HERE
http://installations.tigoenergy.com/

Click on
New Installation

3 Follow the wizard instructions

2

6. INSTALLING THE OPTIMIZERS

1 Mount the optimizer on the top right corner of the module

Use the string list template or map, to keep track of optimizer placement. This is important for the physical positioning view in the monitoring software, which will greatly help in the future for O&M

2 Place PV modules and optimizers in a way matches the map you made using barcodes.

! The shortest pair of the input cables should be connected to the first panel of each pair

! When there are **odd-length** string(s) with MM-2ES, connect the medium length input cables of the last optimizer in the string together

7. COMMISSIONING

To commission the Tigo equipment there are 3 simple steps that need to be completed:

1. NETWORK TEST
2. GATEWAY TEST
3. DISCOVERY

For systems with multiple MMUs, these tests need to be performed to each individual MMU.

Network and Gateway tests can run at the same time on different MMUs. However, discovery must be initiated on MMUs one by one, making sure GTWY discovery stage is complete before moving to the next MMU.

This may take several minutes to several hours depending on the size of the system.

Note: The discovery process can be initiated only after the online configuration of the system has been completed and downloaded by the MMU. Requires an Internet connection.

MMU MENU:

1. Status
   - 1.1. Modules
     - 1.1.1. Signal
     - 1.1.2. Voltage
     - 1.1.3. Power
   - 1.2. Date / Time
   - 1.3. Unit ID
   - 1.4. Version
   - 1.5. Config (internal use only)
2. Control
   - 2.1. Discovery
   - 2.2. Modules ON
   - 2.3. Push Data
   - 2.4. Restart
   - 2.5. Gateway Test
   - 2.6. Replace GW
   - 2.7. H/W Test (internal use only)
3. Network
   - 3.1. Display IP
   - 3.2. Test
   - 3.3. Configure
   - 3.4. Set Proxy
   - 3.5. Renew

8. CONNECTING MODBUS DEVICES (OPTIONAL)

| GND | DATA + | DATA - | N/A |

1 AC meter or inverter installation manual

2

Accessories Terminal
G + - N/A

Gateway Terminal
- + B A

To GTWY

3 Tigo Tech Support
1.408.402.0802 ext 2
00800.CALL.TIGO(2255.8446)

Modbus device B

Modbus device A

Series connection for multiple similar devices

Recommended settings:
- 9600 baud rate
- 8 bits data
- 1 stop bit
- No parity

TECHNICAL SPECIFICATIONS

Electrical Specifications

Data	MM-2ES50 (per input)	MM-2ES75 (per input)	MMJ-ES50 / HBF-ES50 / TS4-L**	MM-ES50	MM-ES75	MM-ES110	MM-ES170
Maximum power	375W	375W	375W	300W	300W	300W	300W
Maximum VDC (Voc)	52V	75V	52V	52V	75V	110V	170V
Vmp range	16-48V	30-65V	16-48V	16-48V	30-65V	30-89V	30-140V
Maximum current (Isc)	10A	7.5A	10A	10A	7.5A	5A	3A
Maximum Imp	9.5A	6.5A	9.5A	9.5A	6.5A	4.7A	2.6A
Series fuse rating	15A	10A	15A	15A	10A	10A	10A

Mechanical Specifications

Dimensions 2ES, Gateway*	120 x 104 x 25 mm	Dimensions JES*	171 x 155 x 22 mm	Dimensions MMU*	226 x 226 x 125 mm
Dimensions CC*	160 x 90 x 58 mm	Standard (ST) output cable length	1.3 m	XL output cable length	2.1 m
Maximizer output cable & connector	PV wire 12 AWG 4mm², MC4	Tyco SOLARLOCK: Tigo Positive input accepts Tyco male (+) or neutral keying. Tigo Negative accepts female (+) or (-) keying. Do not connect any other type.			

Environmental Specifications

Operating temperature 2ES, GTWY	-30°C to + 70°C	Operating temperature J-ES / HBF	-40°C to + 85°C	Operating temperature MMU	0°C to + 70°C
Operating temperature CC	-20°C to + 70°C	Operating temperature CC socket power supply	0°C to + 45°C	Operating temperature CC din rail power supply	-20°C to + 60°C

Optimizers: NEMA 3R, IP65, OVPIII, UV-F1/UL 94-5VA		MMU: Class 4K 4H (per EN 50187)	
Connection MMU to the internet	Ethernet	MMU Power supply rating	24Vdc 1A
Power consumption MMU	2.5W	Power consumption Gateway	0.5W
Power consumption CC	>4W	Connection CC to the internet	Ethernet or WiFi

*Dimensions are without mounting accessories or cables. Please refer to drawings in datasheets for more accurate information.

** Different product names refer to different mechanical enclosures

TABLE OF CONTENTS

1. SYSTEM OVERVIEW

Max 95" (241 cm)

2ES-ST
For portrait installations

2ES-XL
For landscape installations

Max 150" (380 cm)

Gateway
(GTWY)

To Next
Gateway

Internet

Inverter

Cloud Connect
(CC)

MM-2ES
Optimizer

Tigo's Monitoring
Software for
Systems
Management

DESIGN RULES:

1 CC:

- Up to 7 GTWYs and **360 PV modules** (180 2ES units)

- All PV modules in the same string must be assigned to the same CC

1 GTWY:

- Up to 120 PV modules (60 2ES units)

- Optimizers must be within 10m-15m (33-50 ft.) from the GW, depending on roof topology

For further information CLICK HERE

CC AND GTWY CALCULATOR:

For the number of CCs and GTWYs required for your project CLICK HERE

2. INSTALLING THE CLOUD CONNECT (CC)

OPTIONAL
Emergency Push Button

Wired **Ethernet** connection option

1

90.2mm (3.55")

159.5mm (6.28")

PV 2.0 Cloud Connect   **Tigo**

MENU ENTER

PV SAFE

USB Host   I/O - +   Ethernet

Wi-Fi Antenna   Optional ⏚ ■ B A   Gateways - + B A   Input 24VDC - - + +

G ■ B A   - + B A   - - + +

57.5mm (2.26")

OPTIONAL
For 3rd party devices

2

Power Supply
24Vdc input

OPTIONAL
Wi-Fi Antenna*
As an internet connection and / or for commissioning with a Smart Phone

3

Gateway
Plug in GTWY(s) cable after all the GTWY(s) are connected in series (next page)

For Rapid Shutdown, install CC on the same AC panel as the inverter

*In case CC is mounted in a metal enclosure, extend this antenna out of the box in order to use Wi-Fi as an internet connection

---

WHERE TO PLACE:

- On a wall or beam

- Next to the inverter

- Out of direct sunlight

3 CONNECTIONS:

1. Internet connection, using one of the options:
   - Ethernet Port
   - Built in Wi-Fi
     - Wi-Fi connection is configured using the Tigo SMART app

2. Power supply: 2 options:
   - DIN Rail Power Supply
   - Wall Socket Power Supply
   - CLICK HERE for details

3. GTWY
   - More on RS485 cables in the next page

Complete CC menu options in 7. Commissioning

CLICK HERE for Tigo SMART app guide

POWER SUPPLY OPTIONS

Wall Outlet Plug		Din Rail	
Tigo Power supply only P/N	983-00070-00	Tigo Power supply only P/N	983-00054-00
Tigo CC Kit P/N	333-00000-10	Tigo CC Kit P/N	333-00000-00
Manufacturer, P/N	Click, CPS024240100*	Manufacturer, P/N	Mean Well, DR-15-24
Input	85-264VAC 47Hz-63Hz	Input	100-240VAC 50Hz/60Hz
Output	24VDC 0.63A	Output	24VDC 1A
Temperature rating	0°C to +45°C	Temperature rating	-20°C to +60°C

3. INSTALLING GATEWAYS (GTWY)

1 Run a wire from the Cloud Connect (CC) to the first GTWY

2 Place on back of PV module or Racking system

In center of sub-array

3/8" (0.952 cm)

Last GTWY or single GTWY installation

Sub-array 1 (back) Sub-array 2 Last sub-array

GTWY

50ft (15m)

Connection to next GTWY (remove resistor first)

finger tight only

120 Ω

Inbound from CC / previous GTWY connection

Standard communication cable: type PLTC, 2 twisted pair, sunlight resistant or direct bury**

RS485 maximum cable length in ft. (m)

AWG (mm²)	1 Gateway	2 Gateways	3 Gateways	4 Gateways	5 Gateways	6 Gateways	7 Gateways
18 (0.82)	2,604 (793)	2,604 (793)	1,817 (553)	1,363 (415)	1,090 (332)	908 (276)	716 (218)
20 (0.52)	2,604 (793)	1,714 (522)	1,143 (348)	857 (261)	686 (209)	571 (174)	456 (138)
22 (0.33)	2,156 (657)	1,078 (328)	719 (219)	539 (164)	431 (131)	359 (109)	287 (87)
CAT 5/6	4,067 (1,239)	2,034 (619)	1,356 (413)	1,017 (309)	813 (247)	678 (206)	543 (165)

CLICK HERE for a detailed Gateway hardware guide,
**CLICK HERE for CAT 5/6 wiring instructions

DONE? Connect terminal in CC
Perform GTWY Test: 2.5 on CC menu

3

4. MAPPING

Take out optimizers & remove 1 barcode sticker. Place the sticker on the map, string list, or construction drawing to match the physical location of the optimizer.

MM-2ES dual optimizer has one serial number for every two PV modules.

Assign barcodes only to first PV module in the pair. The second will be filled in automatically once you enter the barcodes online.

Also record the serial numbers of the MMUs and GTWYs.

NOTE:

The PV module barcode or serial number doesn't apply for module level monitoring at the moment. MAKE SURE you take the optimizer's label, NOT the module's

5. CONFIGURE THE SYSTEM ONLINE

1

CLICK HERE
http://installations.tigoenergy.com/

3 Follow the wizard instructions

Click on
New Installation

2

6. INSTALLING THE OPTIMIZERS

1 Mount the optimizer on the top right corner of the module

Use the string list template or map, to keep track of optimizer placement. This is important for the physical positioning view in the monitoring software, which will greatly help in the future for O&M

2 Place PV modules and optimizers in a way matches the map you made using barcodes.

! The shortest pair of the input cables should be connected to the first panel of each pair

! When there are **odd-length** string(s) with MM-2ES, connect the medium length input cables of the last optimizer in the string together

7. COMMISSIONING

To commission the Tigo equipment there are 3 simple steps that need to be completed:

1. NETWORK TEST
2. GATEWAY TEST
3. DISCOVERY

For systems with multiple Cloud Connect units, these tests need to be performed to each individual CC.

Network and Gateway tests can run at the same time on different CCs. However, discovery must be initiated on CCs one by one, making sure GTWY discovery stage is complete before moving to the next CC.

This may take several minutes to several hours depending on the size of the system.

Note: The discovery process can be initiated only after the online configuration of the system has been completed and downloaded by the CC. Requires an Internet connection.

To Commission the system using your Smart Phone, download the Tigo SMART app and follow its instructions, CLICK HERE to see a manual.

CC MENU:

1. Status
   - 1.1. Modules
     - 1.1.1. Signal
     - 1.1.2. Voltage
     - 1.1.3. Power
   - 1.2. Date / Time
   - 1.3. Unit ID
   - 1.4. Version
   - 1.5. Config (internal use only)
2. Control
   - 2.1. Discovery
   - 2.2. Modules ON
   - 2.3. Push Data
   - 2.4. Restart
   - 2.5. Gateway Test
   - 2.6. Replace GW
   - 2.7. H/W Test (internal use only)
3. Network
   - 3.1. Display IP
   - 3.2. Test
   - 3.3. Configure
   - 3.4. Set Proxy
   - 3.5. Renew

8. CONNECTING MODBUS DEVICES (OPTIONAL)

Tigo Tech Support
1.408.402.0802 ext 2
00800.CALL.TIGO(2255.8446)

AC meter or inverter installation manual

USB Host

I/O − +

Ethernet

PV 2.0 Cloud Connect

MENU ENTER

PV SAFE

Wi-Fi Antenna

Optional + ■ B A

Gateways − + B A

Input 24VDC − − + +

G ■ B A

To GTWY

Modbus device B

Modbus device A

Series connection for multiple similar devices

Recommended settings:
- 9600 baud rate
- 8 bits data
- 1 stop bit
- No parity

TECHNICAL SPECIFICATIONS

Electrical Specifications

Data	MM-2ES50 (per input)	MM-2ES75 (per input)	MMJ-ES50 / HBF-ES50 / TS4-L**	MM-ES50	MM-ES75	MM-ES110	MM-ES170
Maximum power	375W	375W	375W	300W	300W	300W	300W
Maximum VDC (Voc)	52V	75V	52V	52V	75V	110V	170V
Vmp range	16-48V	30-65V	16-48V	16-48V	30-65V	30-89V	30-140V
Maximum current (Isc)	10A	7.5A	10A	10A	7.5A	5A	3A
Maximum Imp	9.5A	6.5A	9.5A	9.5A	6.5A	4.7A	2.6A
Series fuse rating	15A	10A	15A	15A	10A	10A	10A

Mechanical Specifications

Dimensions 2ES, Gateway*	120 x 104 x 25 mm	Dimensions JES*	171 x 155 x 22 mm	Dimensions MMU*	226 x 226 x 125 mm
Dimensions CC*	160 x 90 x 58 mm	Standard (ST) output cable length	1.3 m	XL output cable length	2.1 m
Maximizer output cable & connector	PV wire 12 AWG 4mm², MC4	Tyco SOLARLOCK: Tigo Positive input accepts Tyco male (+) or neutral keying. Tigo Negative accepts female (+) or (-) keying. Do not connect any other type.			

Environmental Specifications

Operating temperature 2ES, GTWY	-30°C to + 70°C	Operating temperature J-ES / HBF	-40°C to + 85°C	Operating temperature MMU	0°C to + 70°C
Operating temperature CC	-20°C to + 70°C	Operating temperature CC socket power supply	0°C to + 45°C	Operating temperature CC din rail power supply	-20°C to + 60°C

Optimizers: NEMA 3R, IP65, OVPIII, UV-F1/UL 94-5VA		MMU: Class 4K 4H (per EN 50187)	
Connection MMU to the internet	Ethernet	MMU Power supply rating	24Vdc 1A
Power consumption MMU	2.5W	Power consumption Gateway	0.5W
Power consumption CC	>4W	Connection CC to the internet	Ethernet or WiFi

*Dimensions are without mounting accessories or cables. Please refer to drawings in datasheets for more accurate information.

** Different product names refer to different mechanical enclosures

YOU'RE GOOD TO GO!

For more details on designing and installing solutions powered by Tigo, please visit:

- [Tigo Academy](#)

- [Agora](#)

Or contact us at:

- Support@tigoenergy.com

- 1.408.402.0802 #2

GOOD LUCK!

Tigo Customer Care