

Model GX10/GX20/GP10/GP20/GM10

**WT Communication (/E2)
User's Manual**

Introduction

Thank you for purchasing the SMARTDAC+ Series GX10/GX20/GP10/GP20/GM10 (hereafter referred to as the recorder, GX, GP, or GM).

This manual explains the WT communication function of the GX, GP, and GM.

Although the display of GX20 is used in this manual, GX10/GP10/GP20 can be operated similarly. Moreover, for the GM10, the same content can be displayed on a Web browser.

In this manual, the GX20, GP20, and GM10 standard type and large memory type are distinguished using the following notations.

- Standard type: GX20-1/GP20-1/GM10-1
- Large memory type: GX20-2/GP20-2/GM10-2

For details on the features of the recorder and how to use it, read this manual together with the following user's manuals.

- Model GX10/GX20/GP10/GP20 Paperless Recorder First Step Guide (IM 04L51B01-02EN)
- Model GX10/GX20/GP10/GP20 Paperless Recorder User's Manual (IM 04L51B01-01EN)
- Data Acquisition System GM First Step Guide (IM 04L55B01-02EN)
- Data Acquisition System GM User's Manual (IM 04L55B01-01EN)

To ensure correct use, please read this manual thoroughly before beginning operation.

The following manuals are provided for the GX/GP/GM.

• Paper Manuals

Model	Manual Title	Manual No.	Description
GX/GP	Model GX10/GX20/GP10/GP20 Paperless Recorder First Step Guide	IM 04L51B01-02EN	Explains the basic operations of the GX/GP.
GM	Data Acquisition System GM First Step Guide	IM 04L55B01-02EN	Explains the basic operations of the GM

• Downloadable Electronic Manuals

You can download the latest manuals from the following website.

www.smartdacplus.com/manual/en/

Model	Manual Title	Manual No.	Description
GX/GP	Model GX10/GX20/GP10/GP20 Paperless Recorder First Step Guide	IM 04L51B01-02EN	This is the electronic version of the paper manual.
	Model GX10/GX20/GP10/GP20 Paperless Recorder User's Manual	IM 04L51B01-01EN	Describes how to use the GX/GP. The communication control commands and some of the options are excluded.
	Model GX10/GX20/GP10/GP20 Advanced Security Function (/AS) User's Manual	IM 04L51B01-05EN	Describes how to use the advanced security function (/AS option).
GM	GM Data Acquisition System First Step Guide	IM 04L55B01-02EN	This is the electronic version of the paper manual.
	GM Data Acquisition System User's Manual	IM 04L55B01-01EN	Describes how to use the GM. The communication control commands and some of the options are excluded.
	GM Data Acquisition System Advanced Security Function (/AS) User's Manual	IM 04L55B01-05EN	Describes how to use the advanced security function (/AS option).
GX/GP GM	Model GX10/GX20/GP10/GP20/GM10 Communication Commands User's Manual	IM 04L51B01-17EN	Describes how to use command control communication functions.
	SMARTDAC+ STANDARD Universal Viewer User's Manual	IM 04L61B01-01EN	Describes how to use Universal Viewer, which is a software that displays GX/GP/GM measurement data files.
	SMARTDAC+ STANDARD Hardware Configurator User's Manual	IM 04L61B01-02EN	Describes how to use the PC software for creating setting parameters for various GX/GP/GM functions.
	Model GX10/GX20/GP10/GP20/GM10 Multi-batch Function (/BT) User's Manual	IM 04L51B01-03EN	Describes how to use the multi-batch function (/BT option).
	Model GX10/GX20/GP10/GP20/GM10 Log Scale (/LG) User's Manual	IM 04L51B01-06EN	Describes how to use the log scale (/LG option).
	Model GX10/GX20/GP10/GP20/GM10 EtherNet/IP Communication (/E1) User's Manual	IM 04L51B01-18EN	Describes how to use the communication functions through the EtherNet/IP (/E1 option).
	Model GX10/GX20/GP10/GP20/GM10 WT Communication (/E2) User's Manual	IM 04L51B01-19EN	Describes how to use WT communication (/E2 option).

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Model	Manual Title	Manual No.	Description
GX/GP GM	Model GX10/GX20/GP10/GP20/GM10 OPC-UA Server (/E3) User's Manual	IM 04L51B01-20EN	Describes how to use the OPC-UA server function (/E3 option).
	Model GX10/GX20/GP10/GP20/GM10 SLMP Communication (/E4) User's Manual	IM 04L51B01-21EN	Describes how to use SLMP communication function (/E4 option).
	Model GX10/GX20/GP10/GP20/GM10/ GX90NW PROFINET Communication User's Manual	IM 04L51B01-22EN	Describes how to use PROFINET communication function.
	Model GX10/GX20/GP10/GP20/GM10 Loop Control Function, Program Control Function (/PG Option) User's Manual	IM 04L51B01-31EN	Describes how to use the Loop Control Function, Program Control Function (/PG Option).
GX/GP	DXA170 DAQStudio User's Manual	IM 04L41B01-62EN	Describes how to create custom displays (/CG option).

Notes

- The contents of this manual are subject to change without prior notice as a result of continuing improvements to the instrument's performance and functions.
- Every effort has been made in the preparation of this manual to ensure the accuracy of its contents. However, should you have any questions or find any errors, please contact your nearest YOKOGAWA dealer.
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This product uses open source software.

For details on using open source software, see Regarding the Downloading and Installing for the Software, Manuals and Labels (IM 04L61B01-11EN).

Revisions

May 2014	1st Edition
December 2014	2nd Edition
June 2017	3rd Edition
May 2020	4th Edition
May 2023	5th Edition

Recorder Versions Described in This Manual


The contents of this manual apply to the GX/GP/GM10 with the following release number (see the STYLE S number) and later and style number (see the STYLE H number) and later.

Model	Release Number	Style Number
GX10	5	5
GP10		
GX20		3
GP20		4
GM10		1






Edition	Product	Explanation
1	GX/GP: Version 2.01 and later	—
2	GX/GP: Version 2.01 and later GM: Version 2.02 and later	Describes the GM.
3	GX/GP: Version 4.01 and later GM: Version 4.01 and later	Support for release number 4.
4	GX/GP: Version 4.08 and later GM: Version 4.07 and later	Support for style up (H: 3 (GX10/GX20/GP10), H: 4 (GP20)).

Conventions Used in This Manual

Unit	
K	Denotes 1024. Example: 768K (file size)
k	Denotes 1000.

Markings	
	<i>Improper handling or use can lead to injury to the user or damage to the instrument.</i> This symbol appears on the instrument to indicate that the user must refer to the user's manual for special instructions. The same symbol appears in the corresponding place in the user's manual to identify those instructions. In the manual, the symbol is used in conjunction with the word "WARNING" or "CAUTION."
CAUTION	Calls attention to actions or conditions that could cause serious or fatal injury to the user, and precautions that can be taken to prevent such occurrences.
WARNING	Calls attention to actions or conditions that could cause light injury to the user or cause damage to the instrument or user's data, and precautions that can be taken to prevent such occurrences.
CAUTION	Calls attention to information that is important for the proper operation of the instrument.
Note	

Reference Item	
▶	Reference to related operation or explanation is indicated after this mark. Example: ▶ section 4.1

Conventions Used in the Procedural Explanations	
Bold characters	Denotes key or character strings that appear on the screen. Example: Volt
	Indicates the character types that can be used.  uppercase alphabet,  lowercase alphabet,  symbol,  numbers
Procedure	Carry out the procedure according to the step numbers. All procedures are written with inexperienced users in mind; depending on the operation, not all steps need to be taken. Explanation gives information such as limitations related the procedure.
Explanation	
Path	Indicates the setup screen and explains the settings.
Description	

Contents

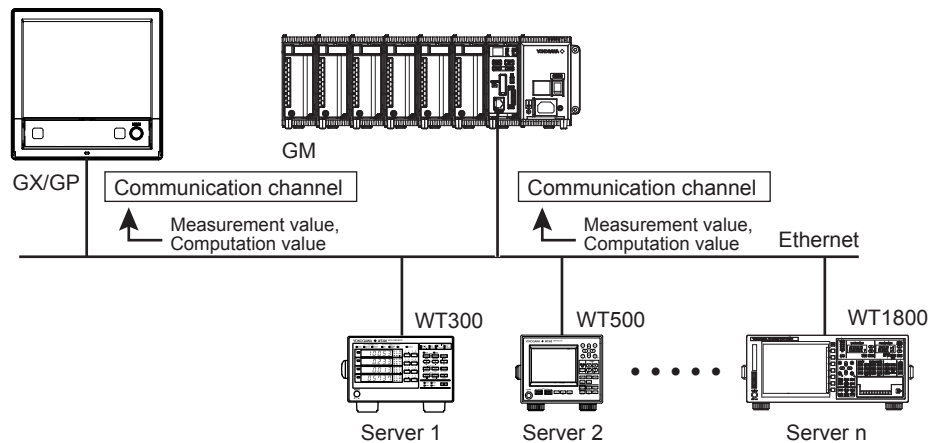
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Using the WT Communication (/E2 option)

Overview

The WT communication function collects values measured and computed on WT power meters and analyzers made by Yokogawa Meters & Instruments Corporation using Ethernet communication into the recorder. The collected data can be assigned to communication channels (/MC option) and displayed and recorded simultaneously with the measured data of the recorder.



Communication Medium

Ethernet

Connectable Models and Options

Maker	Models	Option	Description
Yokogawa Meter & Instrument	WT310/WT330/WT332	/G5	Harmonics Measurement
	WT310E/WT330EH/ WT332E/WT333E (command mode WT300)		
	WT500	/G5	Harmonics Measurement
		/DT	Delta computation
	WT1800	/G5	Harmonic Measurement
	WT1800E (command type WT1800)	/G6	Simultaneous Dual Harmonic Measurement
		/DT	Delta Computation
/MTR		Motor Evaluation Function	
	/AUX	Auxiliary Sensor Inputs	

Maximum Number of Simultaneous Server Connections

Models	Maximum Number of Connections
GX10/GP10	8
GX20/GP20	16
GM10	16

Data Collection Interval

500ms to 30s

Procedure up to Data Collection

1. Connect WTs to the recorder using Ethernet cables.
2. Configure the WT connection client function.
 - Basic settings
Set the WT connection client function to On.
Set the data collection interval and recovery action.
 - Connection destination server settings
Set the server names (IP address or host name) and the model names of the servers (WTs) that the Recorder is to connect to.
 - Assignment of collection data to communication channels
Set the WTs that data is to be collected from, collected items, and exponential scaling of the data read from the WT.
3. Configure communication channels, recording settings, display settings, and so on.
 - Communication channel settings
Set the span, unit, etc.
 - Recording settings
Assign communication channels to recording channels.
 - Display settings
Assign communication channels to display groups.
 - Other settings
Set the watchdog timer.
4. Collect data.

Configuring the WT connection client function

Basic settings

Path

GX/GP: **MENU** key > **Browse** tab > **Setting** > Setting menu **Communication (Ethernet) settings** > **WT connection client settings** > **Basic settings**
Web application: **Config.** tab > **Communication (Ethernet) settings** > **WT connection client basic settings**
Hardware configurator: **Communication (Ethernet) settings** > **WT connection client basic settings**

Description

WT connection client function

Setup Item	Selectable Range or Options	Default Value
On/Off	Off/On	Off

On/Off

Select **On** to use the WT connection client function.

Communication ¹

Setup Item	Selectable Range or Options	Default Value
Interval	500ms/1s/2s/5s/10s/20s/30s	1s

¹ Appears when the WT connection client function is set to **On**.

Interval

Set the interval to collect measured and computed data from the WTs.

Recovery action ¹

Setup Item	Selectable Range or Options	Default Value
Wait time	30s/1min/2min/5min	2min

¹ Appears when the WT connection client function is set to **On**.

Wait time

Set the communication recovery wait time when communication with a WT is interrupted. The Recorder checks the connection status at the specified interval and performs a connection procedure if the connection is disconnected.

WT server settings

Path

GX/GP: **MENU** key > **Browse** tab > **Setting** > Setting menu **Communication (Ethernet) settings > WT connection client settings > WT server settings**
 Web application: **Config.** tab > **Communication (Ethernet) settings > WT connection client server settings**
 Hardware configurator: **Communication (Ethernet) settings > WT connection client server settings**

Description

Setup Item	Selectable Range or Options	Default Value
Server number	GX10/GP10: 1 to 8 GX20/GP20: 1 to 16 GM10: 1 to 16	1

Server number

Select the connection destination server number, which specifies the target WT.

WT server settings

Setup Item	Selectable Range or Options	Default Value
On/Off	Off/On	Off
Server name ¹	Character string (up to 64, Aa#1)	-
Model name ¹	WT300/WT500/WT1800	WT300

¹ Appears when the On/Off settings is set to **On**.

On/Off

Set this to **On** to connect to a WT.

Server name

Set the IP address or host name (when DNS is in use) of the WT to connect to.

Model name

Set the model name of the WT to connect to.

Note

////////////////////////////////////
 If the specified model is different from the actual model, data will not be collected.
 //////////////////////////////////////

Assigning WT Data to Communication Channel

Path

GX/GP: **MENU** key > **Browse** tab > **Setting** > Setting menu **Communication (Ethernet) settings > WT connection client settings > WT data allocation settings**
 Web application: **Config.** tab > **Communication (Ethernet) settings > WT connection client data allocation settings > Allocation No** (display example: 1-20)
 Hardware configurator: **Communication (Ethernet) settings > WT connection client data allocation settings > Allocation No** (display example: 1-20)

Description

Setup Item	Selectable Range or Options	Default Value
Allocation No	GX10/GP10: 1 to 50 GX20/GP20: 1 to 300 GM10: 1 to 300	1

Allocation No

Specify the number to assign to the collected data.

WT data allocation settings

Setup Item	Selectable Range or Options	Default Value
On/Off	Off/On	Off
Server No ¹	GX10/GP10: 1 to 8 GX20/GP20: 1 to 16 GM10: 1 to 16	1
Data group name ¹	³	Off
Data name ²	³	-
Exponential scaling ²	-9 to 18	0
Communication channel ¹	GX10/GP10: 1 to 50 GX20-1/GP20-1: 1 to 300 GX20-2/GP20-2: 1 to 500 GM10-1: 1 to 300 GM10-2: 1 to 500	1

- 1 Appears when the On/Off settings is set to **On**.
- 2 Appears when the data group name is not set to Off.
- 3 Refer to "Data group name and data name".

On/Off

Set this to **On** to collect data from the WT.

Note

If the **On/Off** setting is set to **Off**, data collection from the WT will be stopped. In this situation, communication data will not be updated and will hold the previous value.
 ► For the detailed operation, see "Watchdog Timer" under "Other Settings" in page 13 , "Configuring Communication Channels, Recording Settings, and Display Settings".

Server No

Set the connection destination server number of the server (WT) that data is to be collected from.

Data group name

Set the data group name of measurement function to collect.

▶Refer to “Data group name and data name”.

Note

Data group names can be specified regardless of the number of WT elements to be connected or options. If data is read from elements or options that are not installed in the target WT, it will become NaN (Not a Number) data.

If the data group name is set to OFF, communication data will not be updated and will hold the previous value.

▶For the detailed operation, see “Watchdog Timer” under “Other Settings” in page 13 , “Configuring Communication Channels, Recording Settings, and Display Settings”.

Data name

Set the data name of measurement function to collect.

▶Refer to “Data group name and data name”.

Exponential scaling

Set the exponent used to exponentially scale the data read from the WT using base 10.

For example, if the measured value of the WT is 123.45 kW and you specify -3, the data will be scaled by 10⁻³ to derive data in unit of kW.

Communication channel

Set the communication channel to assign the data collected from the WT to.

Data group name and data name

WT1800

Data group name	Data name	Description	WT Function mark
Off	-	Data assignment is disabled.	-
ELEMENT1 to ELEMENT6	Urms	True rms voltage	Urms
	Umn	Rectified mean voltage calibrated to the rms value	Umn
	Udc	Simple voltage average	Udc
	Irms	True rms current	Irms
	Imn	Rectified mean current calibrated to the rms value	Imn
	Idc	Simple current average	Idc
	P	Active power	P
	S	Apparent power	S
	Q	Reactive power	Q
	LAMBDA	Power factor	λ
	PHI	Phase difference	φ
	fU	voltage frequency	fU
	fi	current frequency	fi
	Time	Integration time	Time
	WP	sum of watt hours	WP
	WP+	Sum of positive P (consumed watt hours)	WP+
	WP-	Sum of negative P (watt hours returned to the power supply)	WP
	q	Sum of positive and negative ampere hours	q
q+	Sum of positive I (ampere hours)	q+	
q-	Sum of negative I (ampere hours)	q-	
ElemHrm1 to ElemHrm6	U(1)	RMS voltage of harmonic order 1	U(1)
	U(Total)	Rms voltage	U(Total)
	I(1)	RMS current of harmonic order 1	I(1)
	I(Total)	Rms current	I(Total)

Continued on next page

Data group name	Data name	Description	WT Function mark
ElemHrm1 to ElemHrm6	Uthd	Ratio of the total harmonic voltage to U(1) or U(Total)	Uthd
	lthd	Ratio of the total harmonic current to I(1) or I(Total)	lthd
SigmaA to SigmaC	Urms	True rms voltage	Urms Σ ¹
	Umn	Rectified mean voltage calibrated to the rms value	Umn Σ
	Irms	True rms current	Irms Σ
	Imn	Rectified mean current calibrated to the rms value	Imn Σ
	P	Active power	P Σ
	S	Apparent power	S Σ
	LAMBDA	Power factor	$\lambda\Sigma$
	PHI	Phase difference	$\varphi\Sigma$
	WP	Sum of positive and negative watt hours	WP Σ
	WP+	Sum of positive P (consumed watt hours)	WP+ Σ
	WP-	Sum of negative P (watt hours returned to the power supply)	WP- Σ
	q	Sum of positive and negative ampere hours	q Σ
	q+	Sum of positive I (ampere hours)	q+ Σ
	q-	Sum of negative I (ampere hours)	q- Σ
Other	ETA1	Efficiency 1	η 1
	ETA2	Efficiency 2	η 2
	ETA3	Efficiency 3	η 3
	ETA4	Efficiency 4	η 4
	F1	User-defined function 1	F1
	F2	User-defined function 2	F2
	F3	User-defined function 3	F3
	F4	User-defined function 4	F4
	F5	User-defined function 5	F5
	F6	User-defined function 6	F6
	F7	User-defined function 7	F7
	F8	User-defined function 8	F8
	F9	User-defined function 9	F9
	F10	User-defined function 10	F10
	F11	User-defined function 11	F11
	F12	User-defined function 12	F12
	F13	User-defined function 13	F13
	F14	User-defined function 14	F14
F15	User-defined function 15	F15	
F16	User-defined function 16	F16	
F17	User-defined function 17	F17	
F18	User-defined function 18	F18	
DeltaA to DeltaC	DELTA U1	Delta computation voltage 1	Δ U1
	DELTA U2	Delta computation voltage 2	Δ U2
	DELTA U3	Delta computation voltage 3	Δ U3
	DELTA U SIGMA	Delta computation wiring voltage	Δ U Σ
	DELTA I	Delta computation current	Δ I
	DELTA P1	Delta computation power 1	Δ P1
	DELTA P2	Delta computation power 2	Δ P2
	DELTA P3	Delta computation power 3	Δ P3
	DELTA P SIGMA	Delta computation wiring power	Δ P Σ
Motor	Speed	Motor rotating speed	Speed
	Torque	Motor torque	Torque
	SyncSP	Synchronous speed	SyncSp
	Slip	Slip (%)	Slip
	Pm	Mechanical output of the motor (mechanical power)	Pm
Aux	Aux1	Auxiliary input 1	Aux1
	Aux2	Auxiliary input 2	Aux2

1 Will become Σ A, Σ B, or Σ C depending on the WT1800 wiring type.

WT500

Data group name	Data name	Description	WT Function mark	
Off	–	Data assignment is disabled.	–	
ELEMENT to ELEMENT3	Urms	True rms voltage	Urms	
	Umn	Rectified mean voltage calibrated to the rms value	Umn	
	Udc	Simple voltage average	Udc	
	Urmn	Rectified mean voltage	Urmn	
	Uac	AC component	Uac	
	Irms	True rms current	Irms	
	Imn	Rectified mean current calibrated to the rms value	Imn	
	Idc	Simple current average	Idc	
	Irmn	Rectified mean current	Irmn	
	Iac	AC component	Iac	
	P	Active power	P	
	S	Apparent power	S	
	Q	Reactive power	Q	
	LAMBDA	Power factor	λ	
	PHI	Phase difference	φ	
	fU	Voltage frequency	fU	
	fl	Current frequency	fl	
	U+pk	Maximum voltage	U+pk	
	U–pk	Minimum voltage	U–pk	
	I+pk	Maximum current	I+pk	
	I–pk	Minimum current	I–pk	
	CfU	Voltage crest factor	CfU	
	Cfl	Current crest factor	Cfl	
	Time	Integration time	Time	
	WP	Sum of positive and negative watt hours	WP	
	WP+	Sum of positive P (consumed watt hours)	WP+	
	WP–	Sum of negative P (watt hours returned to the power supply)	WP	
	q	Sum of positive and negative ampere hours	q	
	q+	Sum of positive I (ampere hours)	q+	
	q–	Sum of negative I (ampere hours)	q–	
	WS	Volt-ampere hours	WS	
	WQ	Var hours	WQ	
	ElemHrm1 to ElemHrm3	U(dc)	Rms voltage of harmonic order 0	U(0)
		U(1)	Rms voltage of harmonic order 1	U(1)
		U(Total)	Rms voltage	U(Total)
		I(dc)	Rms current of harmonic order 0	I(0)
		I(1)	Rms current of harmonic order 1	I(1)
		I(Total)	Rms current	I(Total)
		P(dc)	Active power of harmonic order 0	P(0)
		P(1)	Active power of harmonic order 1	P(1)
P(Total)		Active power	P(Total)	
S(dc)		Apparent power of harmonic order 0	S(0)	
S(1)		Apparent power of harmonic order 1	S(1)	
S(Total)		Total apparent power	S(Total)	
Q(dc)		Reactive power of harmonic order 0	Q(0)	
Q(1)		Reactive power of harmonic order 1	Q(1)	
Q(Total)		Total reactive power	Q(Total)	
LAMBDA(dc)		Power factor of harmonic order 0	λ (0)	
LAMBDA(1)		Power factor of harmonic order 1	λ (1)	
LAMBDA(Total)		Total power factor	λ (Total)	
PHI(1)		Phase difference between the voltage and current of harmonic order 1	φ (1)	
PHI(Total)		Total phase difference	φ (Total)	
PHI U(3)		Phase difference between harmonic voltage U(3) and the fundamental signal U(1).	φ U(3)	
PHI I(3)		Phase difference between harmonic current I(3) and the fundamental signal I(1).	φ I(3)	

Continued on next page

Data group name	Data name	Description	WT Function mark
IemHrm1 to ElemHrm3	Uthd	Ratio of the total harmonic voltage to U(1) or U(Total)	Uthd
	Ithd	Ratio of the total harmonic current to I(1) or I(Total)	Ithd
	Pthd	Ratio of the total harmonic active power to P(1) or P(Total)	Pthd
SigmaA	Urms	True rms voltage	Urms Σ
	Umn	Rectified mean voltage calibrated to the rms value	Umn Σ
	Udc	Simple voltage average	Udc Σ
	Urmn	Rectified mean voltage	Urmn Σ
	Uac	AC component	Uac Σ
	Irms	True rms current	Irms Σ
	Imn	Rectified mean current calibrated to the rms value	Imn Σ
	Idc	Simple current average	Idc Σ
	Irmn	Rectified mean current	Irmn Σ
	Iac	AC component	Iac Σ
	P	Active power	P Σ
	S	Apparent power	S Σ
	Q	Reactive power	Q Σ
	LAMBDA	Power factor	$\lambda\Sigma$
	PHI	Phase difference	$\varphi\Sigma$
	WP	Sum of positive and negative watt hours	WP Σ
	WP+	Sum of positive P (consumed watt hours)	WP+ Σ
	WP-	Sum of negative P (watt hours returned to the power supply)	WP- Σ
	q	Sum of positive and negative ampere hours	q Σ
	q+	Sum of positive I (ampere hours)	q+ Σ
	q-	Sum of negative I (ampere hours)	q- Σ
WS	Integrated value of S Σ	WS Σ	
WQ	Integrated value of Q Σ	WQ Σ	
Other	ETA1	Efficiency 1	η 1
	ETA2	Efficiency 2	η 2
	F1	User-defined function 1	F1
	F2	User-defined function 2	F2
	F3	User-defined function 3	F3
	F4	User-defined function 4	F4
	F5	User-defined function 5	F5
	F6	User-defined function 6	F6
	F7	User-defined function 7	F7
F8	User-defined function 8	F8	
Delta	DELTA F1	Delta computation 1	Δ F1
	DELTA F2	Delta computation 2	Δ F2
	DELTA F3	Delta computation 3	Δ F3
	DELTA F4	Delta computation 4	Δ F4
Phase	PHI U1-U2	The phase difference between the fundamental voltage of element 1, U1(1), and the fundamental voltage of element 2, U2(1)	φ U1-U2
	PHI U1-U3	The phase difference between the fundamental voltage of element 1, U1(1), and the fundamental voltage of element 3, U3(1)	φ U1-U3
	PHI U1-I1	The phase difference between the fundamental voltage of element 1, U1(1), and the fundamental current of element 1, I1(1)	φ U1-I1
Phase	PHI U1-I2	The phase difference between the fundamental voltage of element 1, U1(1), and the fundamental current of element 2, I2(1)	φ U1-I2
	PHI U1-I3	The phase difference between the fundamental voltage of element 1, U1(1), and the fundamental current of element 3, I3(1)	φ U1-I3

WT300

Data group name	Data name	Description	WT Function mark	
Off	-	Data assignment is disabled.	-	
ELEMENT1 to ELEMENT3	U	voltage	U	
	I	current	I	
	P	active power	P	
	S	apparent power	S	
	Q	reactive power	Q	
	LAMBDA	power factor	λ	
	PHI	phase difference	ϕ	
	fU	voltage frequency	fU	
	fI	current frequency	fI	
	U+pk	Maximum voltage	U+pk	
	U-pk	Minimum voltage	U-pk	
	I+pk	Maximum current	I+pk	
	I-pk	Minimum current	I-pk	
	P+pk	Maximum active power	P+pk	
	P-pk	Minimum active power	P-pk	
	Time ¹	Integration time	Time	
	WP	sum of watt hours	WP	
	WP+	Sum of positive P (consumed watt hours)	WP+	
	WP-	Sum of negative P (watt hours returned to the power supply)	WP	
	q	Sum of positive and negative ampere hours	q	
	q+	Sum of positive I (ampere hours)	q+	
	q-	Sum of negative I (ampere hours)	q-	
	ElemHrm1 to ElemHrm3	U(1)	RMS voltage of harmonic order 1	U(1)
		U(Total)	Rms voltage	U(Total)
		I(1)	RMS current of harmonic order 1	I(1)
		I(Total)	Rms current	I(Total)
P(1)		Active power of harmonic order 1	P(1)	
P(Total)		Active power	P(Total)	
LAMBDA(1)		Power factor of harmonic order 1	λ (1)	
PHI(1)		Phase difference between the voltage and current of harmonic order 1	ϕ (1)	
PHI U(3)		Phase difference between harmonic voltage U(3) and the fundamental signal U(1).	ϕ U(3)	
PHI I(3)		Phase difference between harmonic current I(3) and the fundamental signal I(1).	ϕ I(3)	
Uthd		Ratio of the total harmonic voltage to U(1) or U(Total)	Uthd	
Ithd		Ratio of the total harmonic current to I(1) or I(Total)	Ithd	
Uhdf(1)		relative harmonic content of harmonic voltage of order 1	Uhdf(1)	
Ihdf(1)		relative harmonic content of harmonic current of order 1	Ihdf(1)	
Phdf(1)		relative harmonic content of harmonic power of order 1	Phdf(1)	
FPLL ²		Current frequency or voltage frequency of PLL source	fPLL	
SigmaA		U	voltage	U Σ
	I	current	I Σ	
	P	active power	P Σ	
	S	apparent power	S Σ	
	Q	reactive power	Q Σ	
	LAMBDA	power factor	$\lambda\Sigma$	
	PHI	phase difference	$\phi\Sigma$	
	WP	Sum of positive and negative watt hours	WP Σ	
	WP+	Sum of positive P (consumed watt hours)	WP+ Σ	
	WP-	Sum of negative P (watt hours returned to the power supply)	WP- Σ	

Continued on next page

Data group name	Data name	Description	WT Function mark
SigmaA	q	Sum of positive and negative ampere hours	q Σ
	q+	Sum of positive I (ampere hours)	q+ Σ
	Q-	Sum of negative I (ampere hours)	q- Σ
Other	MATH	Computed value, such as efficiency	Math

- 1 "Time" is valid only when the data group is ELEMENT1.
- 2 "FPLL" is valid only when the data group is ElemHrm1.

Valid Data Groups Based on the WT Specifications

Data group names can be specified regardless of the number of WT elements to be connected or options. If data is read from elements or options that are not installed in the target WT, it will become NaN (Not a Number) data.

The following table shows the valid group names depending on the number of WT elements and option specifications.

WT1800

Number of element	Option code	Data group name					
1	-	Element1					
	/G5, /G6	ElemHrm1					
	-	Other					
	/MTR	Motor					
	/AUX	Aux					
2	-	Element1	Element2				
	/G5, /G6	ElemHrm1	ElemHrm2				
	-	SigmaA					
	/DT	DeltaA					
	-	Other					
	/MTR	Motor					
	/AUX	Aux					
3	-	Element1	Element2	Element3			
	/G5, /G6	ElemHrm1	ElemHrm2	ElemHrm3			
	-	SigmaA					
	/DT	DeltaA					
	-	Other					
	/MTR	Motor					
	/AUX	Aux					
4	-	Element1	Element2	Element3	Element4		
	/G5, /G6	ElemHrm1	ElemHrm2	ElemHrm3	ElemHrm4		
	-	SigmaA	SigmaB				
	/DT	DeltaA	DeltaB				
	-	Other					
	/MTR	Motor					
	/AUX	Aux					
5	-	Element1	Element2	Element3	Element4	Element5	
	/G5, /G6	ElemHrm1	ElemHrm2	ElemHrm3	ElemHrm4	ElemHrm5	
	-	SigmaA	SigmaB				
	/DT	DeltaA	DeltaB				
	-	Other					
	/MTR	Motor					
	/AUX	Aux					
6	-	Element1	Element2	Element3	Element4	Element5	Element6
	/G5, /G6	ElemHrm1	ElemHrm2	ElemHrm3	ElemHrm4	ElemHrm5	ElemHrm6
	-	SigmaA	SigmaB	SigmaC			
	/DT	DeltaA	DeltaB	DeltaC			
	-	Other					
	/MTR	Motor					
	/AUX	Aux					

WT500

Number of element	Option code	Data group name		
1	-	Element1		
	/G5	ElemHrm1		
	-	Other		
	/DT	Delta		
	/G5	Phase		
2	-	Element1	Element2	
	/G5	ElemHrm1	ElemHrm2	
	-	SigmaA		
	-	Other		
	/DT	Delta		
3	-	Element1	Element2	Element3
	/G5	ElemHrm1	ElemHrm2	ElemHrm3
	-	SigmaA		
	-	Other		
	/DT	Delta		
/G5	Phase			

WT300

Number of element	Option code	Data group name		
1	-	Element1		
	/G5	ElemHrm1		
	-	Other		
2	-	Element1		Element3
	/G5	ElemHrm1		ElemHrm3
	-	SigmaA		
3	-	Element1	Element2	Element3
	/G5	ElemHrm1	ElemHrm2	ElemHrm3
	-	SigmaA		
-	Other			

Collected Data

- Data is collected from all specified WTs.
WT data that cannot keep up with the read cycle will take on the previous value. In this situation, a data dropout icon appears in the status display. (▶See page 14 , “Monitoring the WT Collection Status”)
- If data cannot be collected from a WT, the previous value will be held. ▶For the detailed operation, see “Watchdog Timer” under “Other Settings” in page 13 , “Configuring Communication Channels, Recording Settings, and Display Settings”.
- If multiple functions are assigned to a single communication channel, the function with the largest assignment number takes precedence.
In addition, if data input through another communication protocol, such as Modbus client or master, uses the same channel, the channel will take on values that are retrieved according to the communication protocol’s data update interval.
Do not assign input from other communication protocols, such as Modbus communication or general communication, to communication channels that WT data is assigned to.

Error Data Handling

Error Data	Communication Channel Value	GX/GP digital display
Data missing	NaN(0x7fc00000)	*****
Over range	9.9E+37	+Over
Over flow		
Over data		

Configuring Communication Channels, Recording Settings, and Display Settings

Communication channel settings

Set the communication channel to assign the data collected from the WT to.

► See section 1.20, “Setting Communication Channels (/MC option),” in the User’s Manual (IM 04L51B01-01EN) or section 2.21, “Setting Communication Channels (/MC option),” in the User’s Manual (IM 04L55B01-01EN).

Recording settings

Assign communication channels to recording channels.

► For details on setting recording channels, see section 1.12.2, “Setting Recording Channels,” in the User’s Manual (IM 04L51B01-01EN) or section 2.13.2, “Setting Recording Channels,” in the User’s Manual (IM 04L55B01-01EN).

Display settings

Assign communication channels to display groups.

► See section 1.10.2, “Setting Display Groups,” in the User’s Manual (IM 04L51B01-01EN) or section 2.11.2, “Setting Display Groups,” in the User’s Manual (IM 04L55B01-01EN).

Other settings

Watchdog timer

The watchdog timer function replaces values with their preset values or last values and when values are not updated within the specified duration (timer) . Set the watchdog timer so that communication interruptions caused by communication errors can be detected.

► See section 1.20, “Setting Communication Channels (/MC option),” in the User’s Manual (IM 04L51B01-01EN) or section 2.21, “Setting Communication Channels (/MC option),” in the User’s Manual (IM 04L55B01-01EN).

Status Output

On a GX/GP, notification can be sent when there is a WT communication error due to a communication error with the status relay (/FL option).

► See section 1.23.6, “Setting the FAIL Relay and Instrument Information Output (/FL option),” in the User’s Manual (IM 04L51B01-01EN) .

On a GM, you can use the event action function to send a notification when there is a WT communication error.

► See section 2.20, “Configuring the Event Action Function,” in the User’s Manual (IM 04L55B01-01EN).

Monitoring the WT Collection Status

You can check the status of the communication with the WT.

Procedure

GX/GP Main Unit

1. Press **MENU**.
The menu screen appears.
2. Tap the **Browse** tab and then **WT Client**.
The connection status is displayed.

Scroll

The screenshot shows the 'WT client' interface. At the top, it displays '2014/04/28 17:46:59' and 'EVENT'. Below this, there are controls for 'Read cycle :1s', 'UP', 'DOWN', and 'Auto recovery :30s'. A table lists communication data:

NO	Status	Server name	Model	Elements
1	VALID	192.168.0.2	WT300	3

A yellow triangle icon with an exclamation mark is located to the right of the table. A red arrow points from the text 'Data Dropout Icon Indication' to this icon. Another red arrow points from the text 'Tapping the data dropout icon (ACK) clears the indication.' to the same icon. A red arrow points from the text 'WT communication information' to a pop-up window titled 'WT communication information' which contains the following data:

NO	1
Status	VALID
Server name	192.168.0.2
Model	WT300
Elements	3
Option	/G5

Red lines connect the table columns to labels: 'NO' to 'Number of elements', 'Status' to 'Communication status', 'Server name' to 'Server name', and 'Model' to 'Model name'. Blue double-headed arrows next to the text 'Drag or flick to scroll' indicate the scrollable nature of the table.




3. Tap an item to display the WT communication information.
The number of elements and options are displayed when connection is established.

Operation complete

Data Dropout Icon Indication

If data cannot be connected from a WT within the read cycle, a data dropout icon appears. Tapping the data dropout icon (ACK) clears the indication.

Details

Status		Detail	Description	Cause of the Error and Corrective Action	
(Blank)		WT is not registered.	(Blank)	When connection to the WT has not yet been attempted.	–
Blue		Normal communication.	VALID	Communicating normally.	–
Orange		TCP connection in progress.	CONNECTING	Attempting to connect to the WT.	–
			CONNECTED	Connection has been established, and the WT is waiting for measurement commands.	–
Red		Failed to connect to the WT. Waiting for auto recovery.	HOSTPORT	Unresolved host name. (During port map)	Unresolved DNS. Check the DNS settings.
			HOSTOPEN	Unresolved host name. (During VXI open)	
			CNCTPORT	Unable to connect to the server. (During port map)	Unable to connect to the server (WT). Check the network settings and the server IP address.
			CNCTOPEN	Unable to connect to the server. (During VXI open)	
			COMMPORT	TCP/IP communication error. (During port map)	Communication error. Network error. WT down, etc.
			COMMOPEN	TCP/IP communication error. (During VXI open)	
			COMMCONF	TCP/IP communication error. (During WT configuration.)	
			COMMDATA	TCP/IP communication error. (During data Collection)	
			IDN	Device information error from the WT.	The specified model is not correct.
			PROTOPORT	RPC,VXI protocol error. (During port map)	Error while processing connection. Does not occur in normal situations. A problem on the WT side.
			PROTOOPEN	RPC,VXI protocol error. (During VXI open)	
			PROTOCONF	RPC,VXI protocol error. (During WT configuration.)	
			PROTODATA	RPC,VXI protocol error. (During data Collection)	
			ITEMSET	WT data set (number of items) error.	
NUMSET	WT data quantity (number of outputs) set error.				
FORMSET	WT data format set error.				
NUM	The number of data values from the WT is not appropriate.				

Web application

On the Web application, click **WT Client** on the **Data** tab. A communication status screen will appear.

The screenshot shows a web application interface for monitoring WT Client status. At the top, there are navigation buttons: 'Divide', 'Register', 'Display format', 'Message', and 'Pause/Resume'. Below these, the title is 'Type: WT client'. Underneath, there are settings for 'Read cycle: 1s' and 'Auto recovery: 2min'. A table displays the communication status for a single client. The table has columns for 'NO', 'Status', 'Detail', 'Server name', 'Model', 'Elements', and 'Option'. The first row shows '1' in the 'NO' column, 'HALT' in the 'Status' column (with a red 'X' icon), 'HOSTPORT' in the 'Detail' column, 'WT1800' in the 'Server name' column, 'WT1800' in the 'Model' column, and empty cells for 'Elements' and 'Option'. A yellow warning triangle is visible in the top right corner of the table area. Red lines with dots at the end point from text annotations to specific elements in the interface: 'Click a title to sort the items in its ascending or descending order. An ascending or descending order mark appears.' points to the 'Server name' column header; 'Data dropout icon Click to clear it.' points to the yellow warning triangle; 'Scroll bar' points to the vertical scrollbar on the right; 'Option' points to the 'Option' column header; 'Number of elements' points to the 'Elements' column header; 'Model name' points to the 'Model' column header; 'Server name' points to the 'Server name' column header; and 'Communication status' points to the 'Status' column header.

Click a title to sort the items in its ascending or descending order.
An ascending or descending order mark appears.

Data dropout icon
Click to clear it.

NO	Status	Detail	Server name	Model	Elements	Option
1	HALT	HOSTPORT	WT1800	WT1800		

Scroll bar

Option

Number of elements

Model name

Server name

Communication status