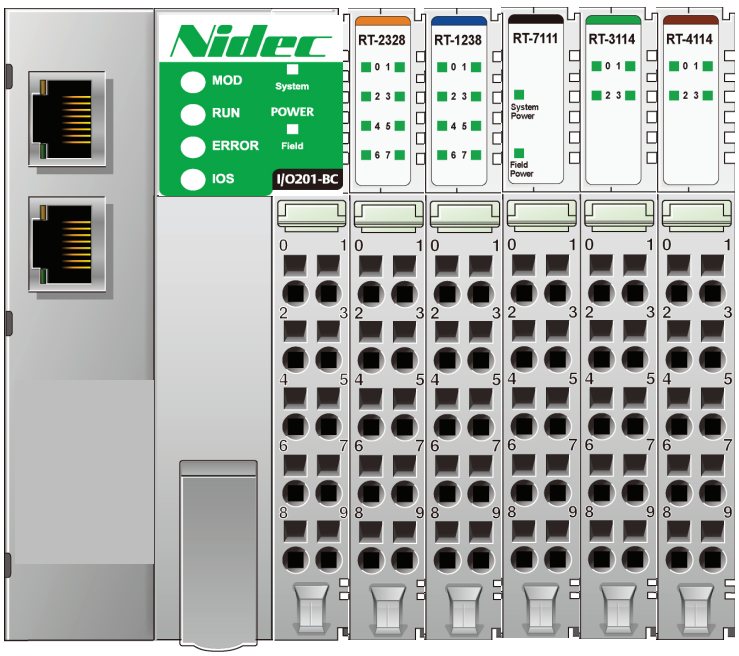
Nidec

All for dreams



User Guide

Remote I/O

EtherCAT Bus Couplers
Input and Output Modules

Part Number: 0478-0279-02
Issue: 2

Original Instructions

For the purposes of compliance with the EU Machinery Directive 2006/42/EC, the English version of this manual is the Original Instructions. Manuals in other languages are Translations of the Original Instructions.

Documentation

Manuals are available to download from the following locations: **http://www.drive-setup.com/ctdownloads**

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In no event and under no circumstances shall the manufacturer be liable for damages and failures due to misuse, abuse, improper installation, or abnormal conditions of temperature, dust, or corrosion, or failures due to operation outside the published ratings. The manufacturer is not liable for consequential and incidental damages. Contact the supplier of the dive for full details of the warranty terms.

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Control Techniques Ltd operates an Environmental Management System (EMS) that conforms to the International Standard ISO 14001.

Further information on our Environmental Policy can be found at: **http://www.drive-setup.com/environment**

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The products covered by this manual comply with European and International regulations on the Restriction of Hazardous Substances including EU directive 2011/65/EU and the Chinese Administrative Measures for Restriction of Hazardous Substances in Electrical and Electronic Products.

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When electronic products reach the end of their useful life, they must not be disposed of along with domestic waste but should be recycled by a specialist recycler of electronic equipment. Control Techniques products are designed to be easily dismantled into their major component parts for efficient recycling. The majority of materials used in the product are suitable for recycling.

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Registered Office

Nidec Control Techniques Ltd
The Gro
Newtown
Powys
SY16 3BE
UK
Registered in England and Wales. Company Reg. No. 01236886.

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Contents

1 Safety information

1.1 Warnings, Cautions and Notes

WARNING

A Warning contains information which is essential for avoiding a safety hazard.

CAUTION

A Caution contains information which is necessary for avoiding a risk of damage to the product or other equipment.

NOTE

A Note contains information which helps to ensure correct operation of the product.

1.2 Important safety information. Hazards. Competence of designers and installers

This guide applies to products which control electric motors either directly (drives) or indirectly (controllers, option modules and other auxiliary equipment and accessories). In all cases the hazards associated with powerful electrical drives are present, and all safety information relating to drives and associated equipment must be observed.

Specific warnings are given at the relevant places in this guide.

Drives and controllers are intended as components for professional incorporation into complete systems. If installed incorrectly they may present a safety hazard. The drive uses high voltages and currents, carries a high level of stored electrical energy, and is used to control equipment which can cause injury. Close attention is required to the electrical installation and the system design to avoid hazards either in normal operation or in the event of equipment malfunction. System design, installation, commissioning/start-up and maintenance must be carried out by personnel who have the necessary training and competence. They must read this safety information and this guide carefully.

1.3 Responsibility

It is the responsibility of the installer to ensure that the equipment is installed correctly with regard to all instructions given in this guide. They must give due consideration to the safety of the complete system, so as to avoid the risk of injury both in normal operation and in the event of a fault or of reasonably foreseeable misuse.

The manufacturer accepts no liability for any consequences resulting from inappropriate, negligent or incorrect installation of the equipment.

1.4 Compliance with regulations

The installer is responsible for complying with all relevant regulations, such as national wiring regulations, accident prevention regulations and electromagnetic compatibility (EMC) regulations. Particular attention must be given to the cross-sectional areas of conductors, the selection of fuses or other protection, and protective ground (earth) connections.

This guide contains instructions for achieving compliance with specific EMC standards.

All machinery to be supplied within the European Union in which this product is used must comply with the following directives:

2006/42/EC Safety of machinery.

2014/30/EU: Electromagnetic Compatibility.

1.5 Electrical hazards

The voltages used in the drive can cause severe electrical shock and/or burns, and could be lethal. Extreme care is necessary at all times when working with or adjacent to the drive. Hazardous voltage may be present in any of the following locations:

- AC and DC supply cables and connections
- Output cables and connections
- Many internal parts of the drive, and external option units

Unless otherwise indicated, control terminals are single insulated and must not be touched.

The supply must be disconnected by an approved electrical isolation device before gaining access to the electrical connections.

The STOP and Safe Torque Off functions of the drive do not isolate dangerous voltages from the output of the drive or from any external option unit.

The drive must be installed in accordance with the instructions given in this guide. Failure to observe the instructions could result in a fire hazard.

1.6 Stored electrical charge

The drive contains capacitors that remain charged to a potentially lethal voltage after the AC supply has been disconnected. If the drive has been energized, the AC supply must be isolated at least ten minutes before work may continue.

1.7 Mechanical hazards

Careful consideration must be given to the functions of the drive or controller which might result in a hazard, either through their intended behaviour or through incorrect operation due to a fault. In any application where a malfunction of the drive or its control system could lead to or allow damage, loss or injury, a risk analysis must be carried out, and where necessary, further measures taken to reduce the risk - for example, an over-speed protection device in case of failure of the speed control, or a fail-safe mechanical brake in case of loss of motor braking.

With the sole exception of the Safe Torque Off function, none of the drive functions must be used to ensure safety of personnel, i.e. they must not be used for safety-related functions.

The Safe Torque Off function may be used in a safety-related application. The system designer is responsible for ensuring that the complete system is safe and designed correctly according to the relevant safety standards.

The design of safety-related control systems must only be done by personnel with the required training and experience. The Safe Torque Off function will only ensure the safety of a machine if it is correctly incorporated into a complete safety system. The system must be subject to a risk assessment to confirm that the residual risk of an unsafe event is at an acceptable level for the application.

1.8 Access to equipment

Access must be restricted to authorized personnel only. Safety regulations which apply at the place of use must be complied with.

1.9 Environmental limits

Instructions in this guide regarding transport, storage, installation and use of the equipment must be complied with, including the specified environmental limits. This includes temperature, humidity, contamination, shock and vibration. Drives must not be subjected to excessive physical force.

1.10 Hazardous environments

The equipment must not be installed in a hazardous environment (i.e. a potentially explosive environment).

1.11 Motor

The safety of the motor under variable speed conditions must be ensured.

To avoid the risk of physical injury, do not exceed the maximum specified speed of the motor.

Low speeds may cause the motor to overheat because the cooling fan becomes less effective, causing a fire hazard. The motor should be installed with a protection thermistor. If necessary, an electric forced vent fan should be used.

The values of the motor parameters set in the drive affect the protection of the motor. The default values in the drive must not be relied upon. It is essential that the correct value is entered in the Motor Rated Current parameter.

1.12 Mechanical brake control

Any brake control functions are provided to allow well co-ordinated operation of an external brake with the drive. While both hardware and software are designed to high standards of quality and robustness, they are not intended for use as safety functions, i.e. where a fault or failure would result in a risk of injury. In any application where the incorrect operation of the brake release mechanism could result in injury, independent protection devices of proven integrity must also be incorporated.

1.13 Adjusting parameters

Some parameters have a profound effect on the operation of the drive. They must not be altered without careful consideration of the impact on the controlled system. Measures must be taken to prevent unwanted changes due to error or tampering.

1.14 Electromagnetic compatibility (EMC)

Installation instructions for a range of EMC environments are provided in the relevant Power Installation Guide. If the installation is poorly designed or other equipment does not comply with suitable standards for EMC, the product might cause or suffer from disturbance due to electromagnetic interaction with other equipment. It is the responsibility of the installer to ensure that the equipment or system into which the product is incorporated complies with the relevant EMC legislation in the place of use.

2 Product information

Control Techniques' range of Remote I/O components includes EtherCAT Bus Couplers, and various I/O Modules.

Included in the range of I/O Modules are digital input, digital output, analog input and analog output variants. Many I/O Modules may have their parameters configured if required, therefore providing a high level of flexibility.

Additionally a range of power expansion and distribution modules allow for extensive configurations and managed wiring.

3 Mechanical installation

Figure 3-1 Bus Coupler in unlocked position

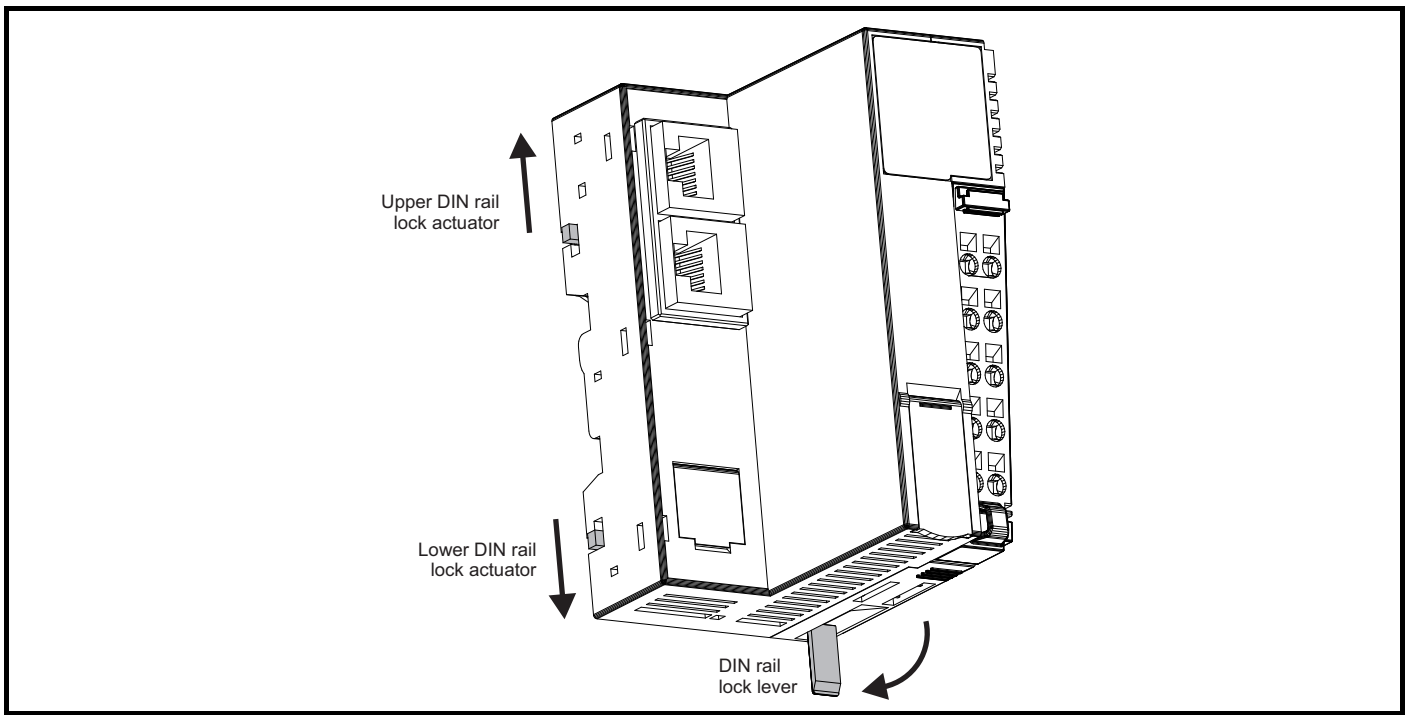


Figure 3-2 Bus Coupler with DIN rail fixed in place and locked position

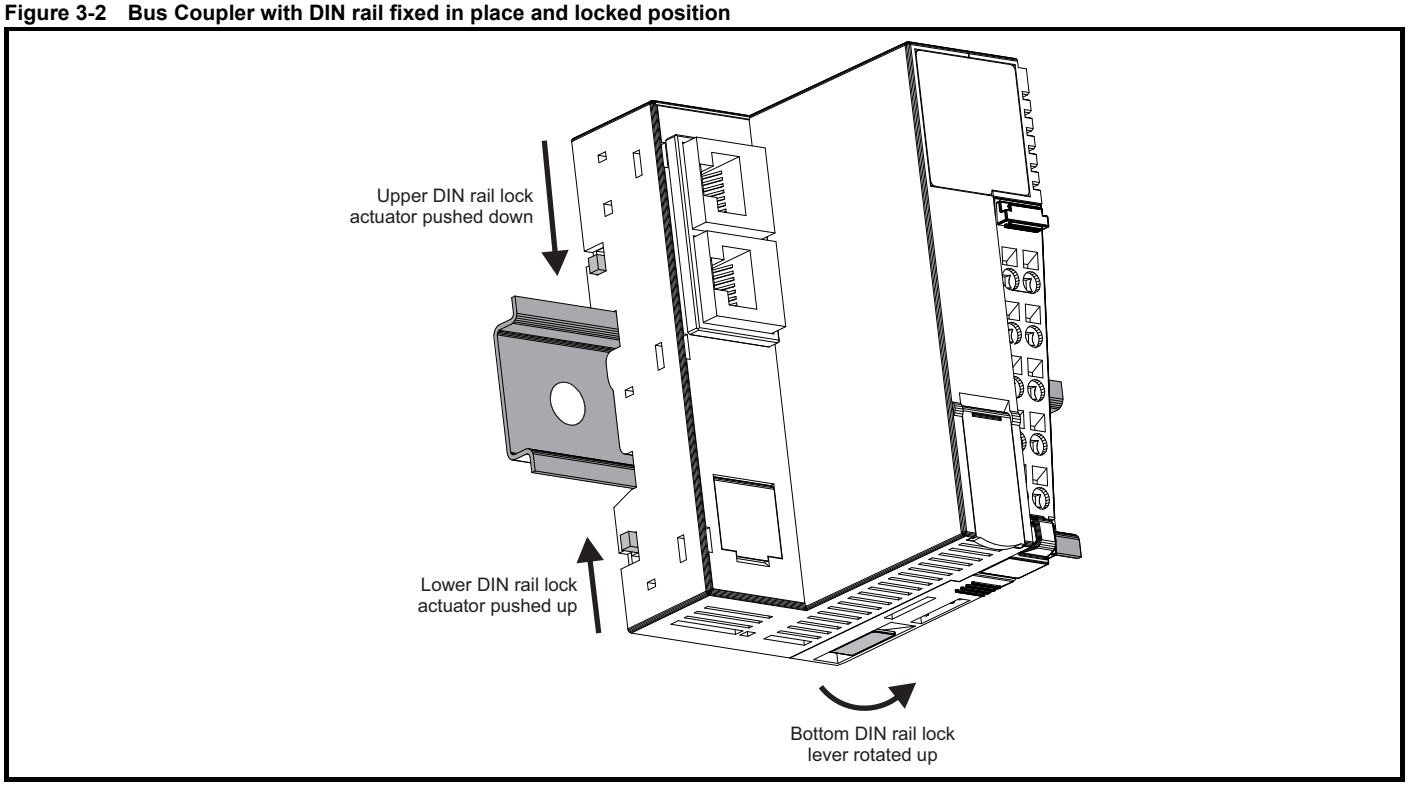
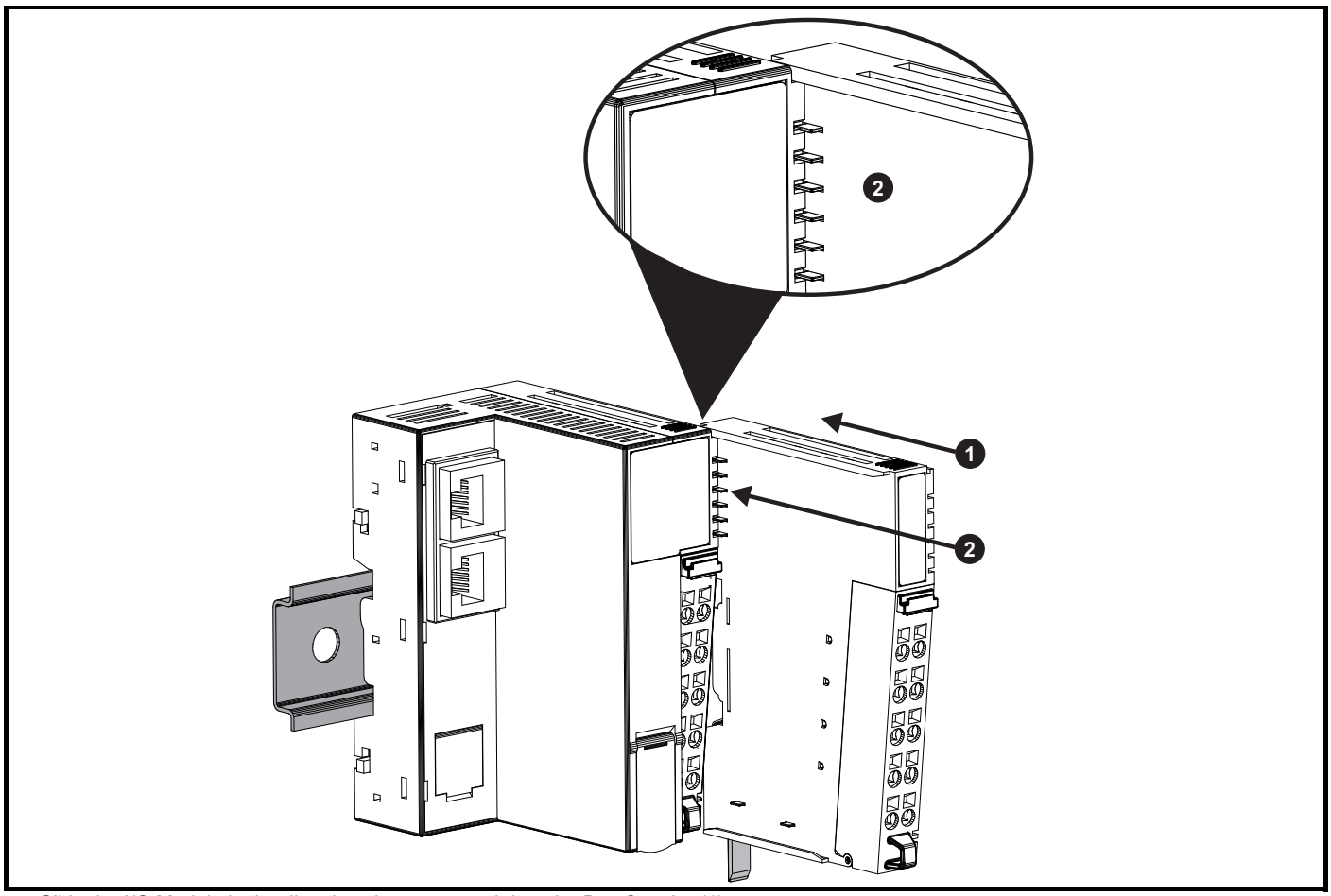
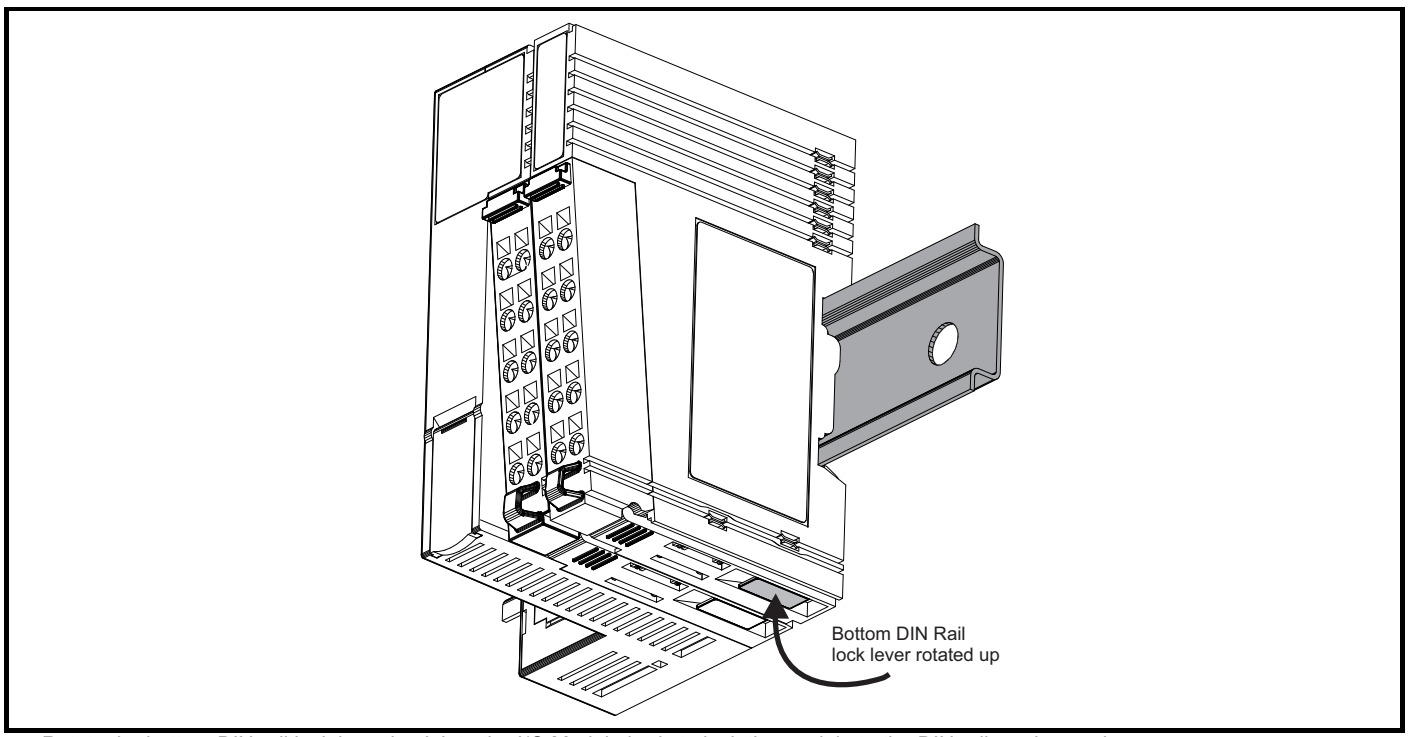


Figure 3-3 Adding an additional I/O Module to the Bus Coupler



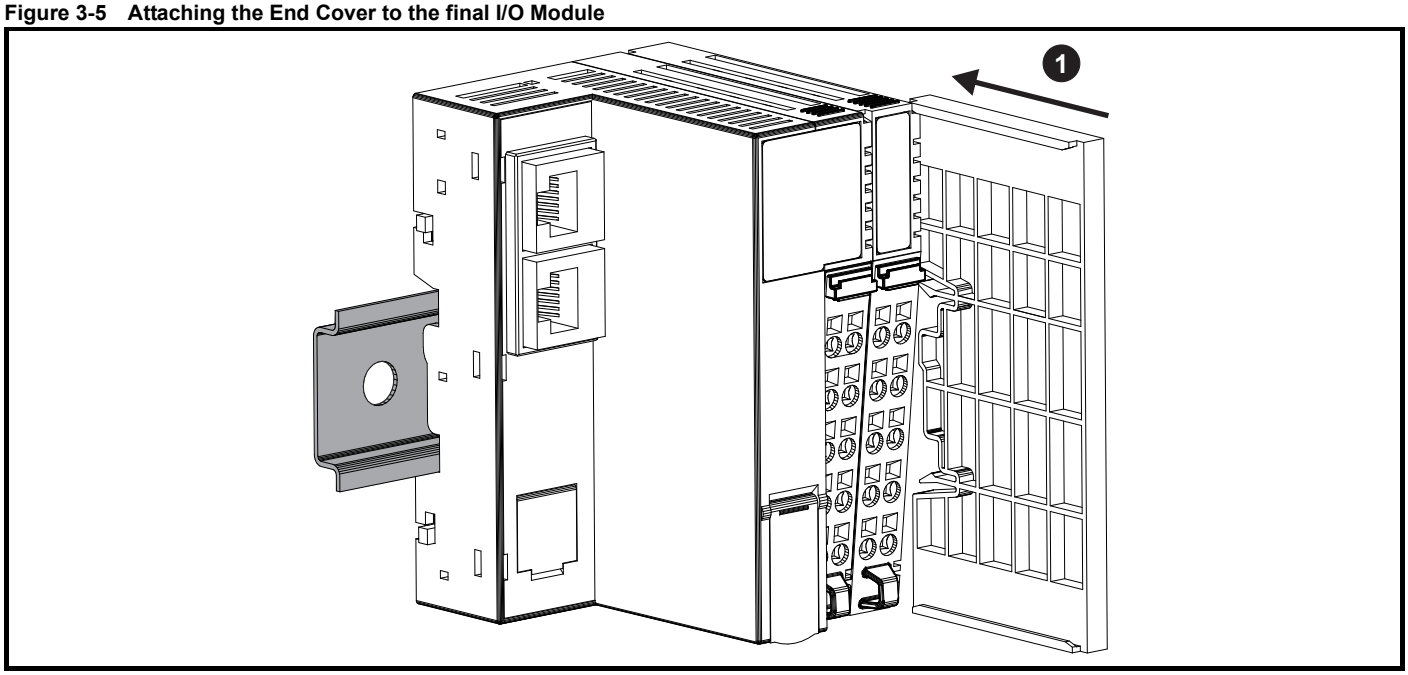
- Slide the I/O Module in the direction shown to attach it to the Bus Coupler (1).
- Align the 6 gold pins on the I/O Module into the slots of the Bus Coupler (2).

Figure 3-4 Locking the I/O Module onto the DIN rail



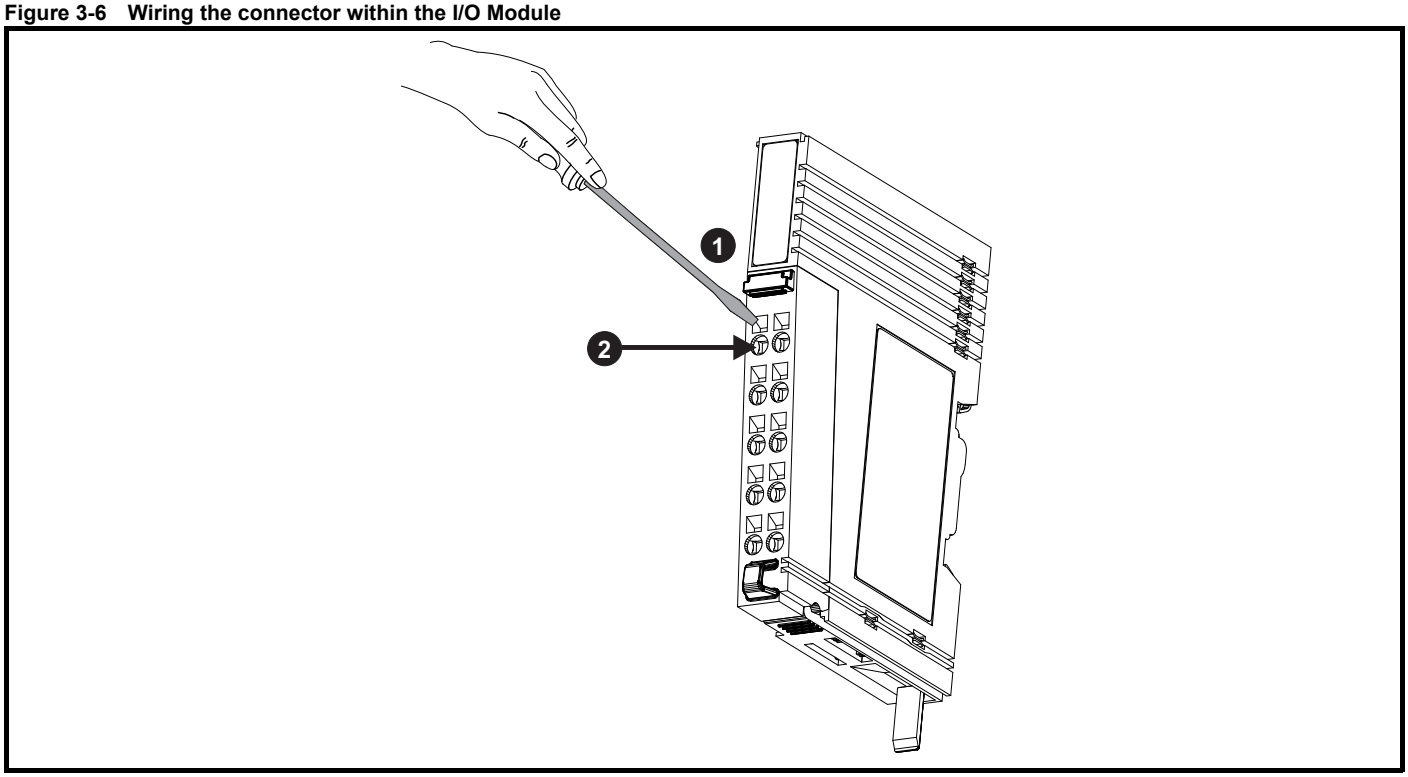
- Rotate the bottom DIN rail lock lever back into the I/O Module body to lock the module to the DIN rail as shown above.

Figure 3-5 Attaching the End Cover to the final I/O Module



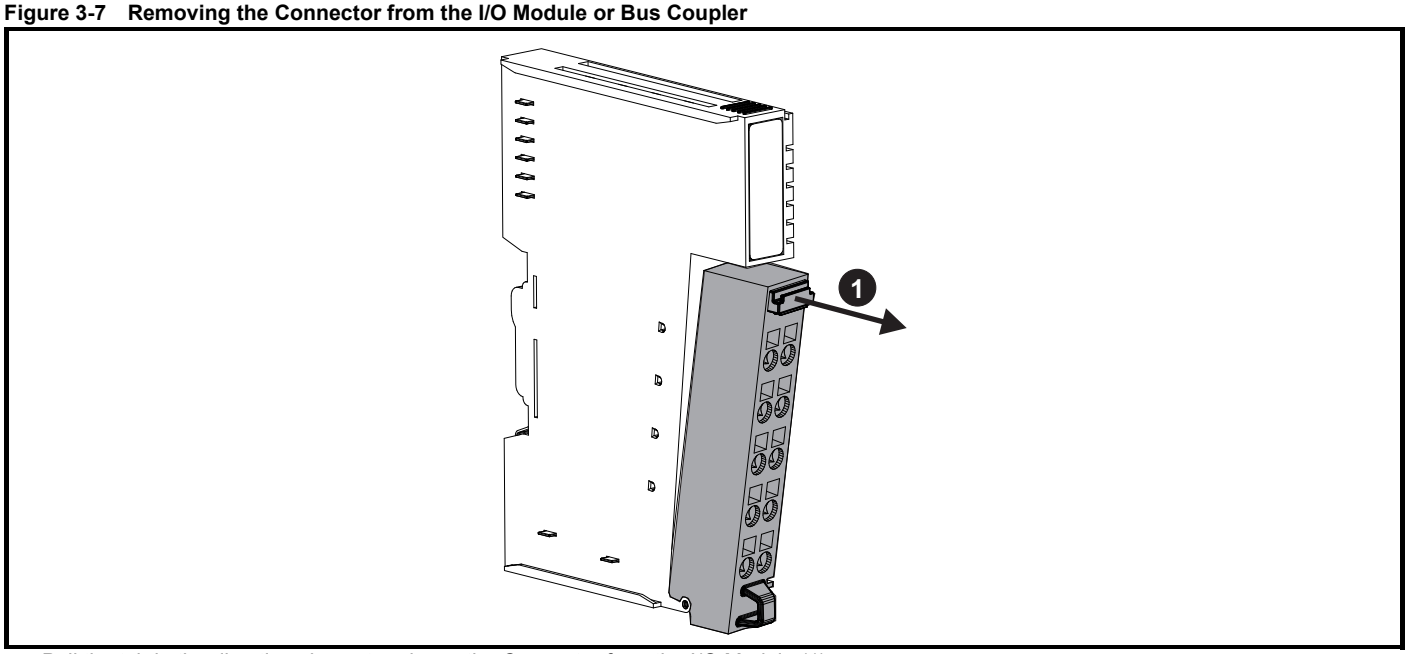
- Attach the End Cover to the final I/O Module by sliding in direction shown (1).

Figure 3-6 Wiring the connector within the I/O Module



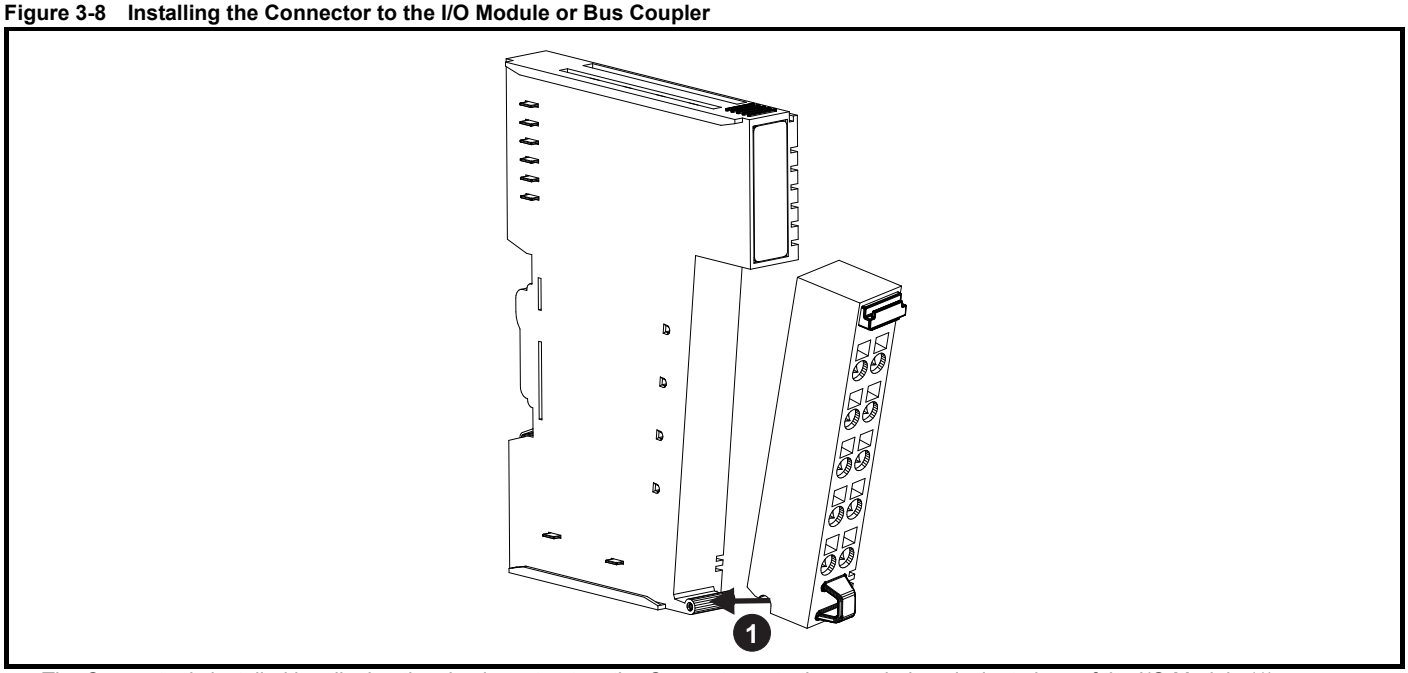
- Push the Insertion tool into the rectangular slot as shown above (1).
- Insert stripped wire into the circular terminal connection, then release / remove the insertion tool to hold wire in place (2).

Figure 3-7 Removing the Connector from the I/O Module or Bus Coupler



- Pull the tab in the direction shown to release the Connector from the I/O Module (1).

Figure 3-8 Installing the Connector to the I/O Module or Bus Coupler



- The Connector is installed by aligning the circular cut out on the Connector onto the rounded equivalent piece of the I/O Module (1).

4 Electrical installation

4.1 Power supply requirements

The I/O201-BC Bus Coupler provides user connections for "system power", "field power" and "field ground".

Refer to the individual Bus Coupler sections for details of connection.

4.1.1 System Power

System power is consumed by the Bus Coupler's circuits, and is also regulated and distributed to be consumed by I/O Modules internal circuits via the "System Power 5 Vdc" and "System Power GND" slide-in connectors mounted to the upper right side of the Bus Coupler and to each upper side of the I/O Modules. Visible on the Bus Coupler is a "System Power" LED that lights green to indicate an external system supply is present.

Each Bus Coupler can provide system power up to a maximum of 1.5 A at 5 Vdc to supply many I/O Modules' internal circuits. It is possible to fit up to 63 I/O Modules to a Bus Coupler. However, if the 1.5 A system power capacity is exceeded by the combined I/O Modules' current demand, then a suitable Expansion Power Module is required. See all the relevant I/O Modules' "Power Dissipation" specifications, and sum their respective values; if the total is in excess of 1.5 A then a suitable Expansion Power Module is required. The RT-7111 Expansion Power Module can provide up to 1 A of system power to further modules (See Chapter 10 *Power module* on page 143).

4.1.2 Field Power

Field Power is distributed from the "Field power 0 Vdc" and "Field Power 24 Vdc" slide-in connections located on the lower right side of the Bus Coupler. Field power is used for example as the supply from output modules to actuators or relays etc, or the supply via switches etc to inputs. Visible on the Bus Coupler is a "Field power" LED that lights green to indicate an external field supply is present.

Each Bus Coupler's Field Supply connector and internal conductor paths between Bus Coupler and I/O Modules can safely pass up to a maximum of 10 A DC.

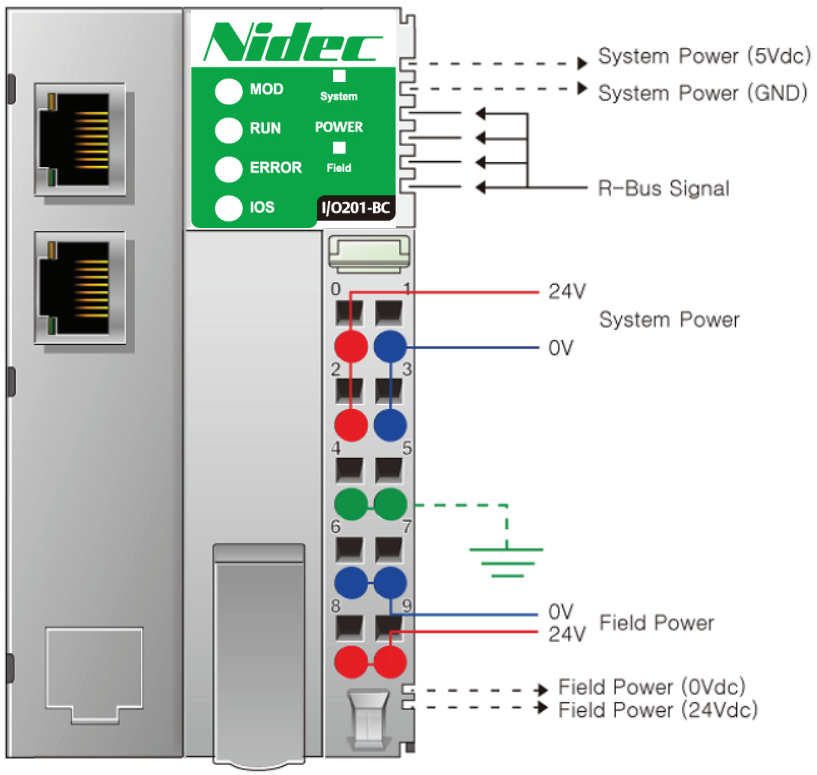
If the combined field power consumed by equipment connected to the relevant I/O Modules exceeds 10 A DC then suitable conductors should provide current directly to relevant I/O Module's field power supply terminals, rather than the internal connections distributing the field power supply.

If different field supplies are required for different sections of I/O, then a suitable Expansion Power Module is required. The RT-7111 and RT-7241 Expansion Power modules can provide further field power distribution up to 10 A DC (See Chapter 10 *Power module* on page 143).

Field Ground is an individual connection located on the Bus Coupler and on I/O Modules.

5 EtherCAT Network Bus Coupler

5.1 I/O201-BC (EtherCAT)



Pin number	Signal description	Signal description	Pin number
0	System Power, 24 V	System Power, Ground	1
2	System Power, 24 V	System Power, Ground	3
4	F.G	F.G	5
6	Field Power, Ground	Field Power, Ground	7
8	Field Power, 24 V	Field Power, 24 V	9

WARNING

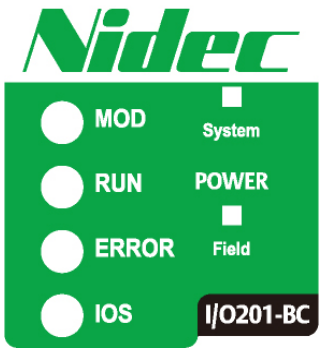
The modules are not hot swappable and must not be removed when the power is on.

Table 5-1 Environmental specification

Environmental specifications	
Operating temperature	-20 °C to 60 °C
Storage temperature	-40 °C to 85 °C
Relative humidity	5 % to 95 % non-condensing
Operating altitude	2000 m
Mounting	DIN rail
Input specification	
Bus Coupler Type	Slave node (EtherCAT)
Maximum Expansion Module	63 slots
Maximum Data Size (Input and Output)	1452 bytes
Data Baud Rate	100 Mbps
Mac Address / IP Address	Not required
Maximum Nodes	65,535
Interface Connector	RJ45 socket x 2
Indicator	6 LEDs 1 Green/Red, Module Status (MOD) 1 Green, Current Running Status (RUN) 1 Green, Error Status (ERROR) 1 Green/Red Expansion I/O Module Status (IOS) 1 Green, System Power Status 1 Green, Field Power Status 2 LEDs (each RJ45 Connector) 1 Yellow, Link/Active 1 Green, Not used
Module Location	Left side of R-Series system
Field Power Detection	About 14 Vdc
General specifications	
System Power	Supply Voltage: 24 Vdc nominal Supply Voltage Range: 16 to 32 Vdc Protection: Output Current limit (Minimum 1.5 A). Reverse polarity protection
Power Dissipation	120 mA typical @ 24 Vdc
Shock operating	IEC 60068-2-27
Vibration resistance	Sine Vibration (Based on IEC 60068-2-6) - • 5 to 25 Hz: ± 1.6 mm • 25 to 300 Hz: 4 g • Sweep Rate: 1 Oct/min, 20 Sweeps Random Vibration (Based on IEC 60068-2-64) • 10 to 40 Hz: 0.0125 g^2/ Hz • 40 to 100 Hz: 0.0125 → 0.002 g^2 /Hz • 100 to 500 Hz: 0.002 g^2/ Hz • 500 to 2000 Hz: 0.002 → 1.3 x 10-$^4g^2$/ Hz • Test time: 1 hr for each test
Current for I/O Module	1.5 A @ 5 Vdc
EMC Resistance Burst/ESD	EN 61000-6-2: 2005 EN 61000-6-4/A11: 2011
Installation Pos. / Protect. Class	Variable/IP20
Product certifications	CE, UL, RoHS
Isolation	System power to internal logic: Non-isolation System power I/O driver: Isolation
Field Power	Supply Voltage: 24 Vdc nominal (Maximum 32 Vdc) Field Power Range is different depending on I/O Module series, Refer to I/O Modules Specification
Maximum Current Field Power Contact	DC 10 A Max
Weight	162 g
Module size	54 mm x 99 mm x 70 mm

5.2 I/O201-BC LED Indicator

Figure 5-1 LED Indicator



LED name	LED function / description	LED colour
MOD	Module status	Green/Red
RUN	Current running status	Green
ERROR	Error Status (EtherCAT)	Green
IOS	Extension Module Status	Green/Red
System Power	System power enable	Green
Field power	Field power enable	Green

Table 5-2 Module status LED (MOD)

State	LED is:	Description
No Power	Off	No power is supplied to the unit.
Device Operational	Green	The unit is operating normally.
Device in Standby	Flashing Green	The EEPROM parameter is not yet initialized. Serial Number is zero value (0x00000000)
Minor Fault	Flashing Red	The unit has discovered a recoverable fault during self-testing. - EEPROM checksum fault
Unrecoverable Fault	Red	The unit has discovered an un-recoverable fault during self-testing. - Firmware fault

Table 5-3 Current running status LED (RUN)

State	LED is:	Description
Init	Off	State of the EtherCAT State Machine: INIT = Initialization
Pre-operational	Blinking	State of the EtherCAT State Machine: PREOP = Pre-Operational
Safe-operational	Single flash	State of the EtherCAT State Machine: SAFEOP = Safe-Operation
Initialization or Bootstrap	Flashes	State of the EtherCAT State Machine: BOOT = Bootstrap (Update of the coupler firmware)
Operational	On	State of the EtherCAT State Machine: OP = Operational

Table 5-4 Error Status LED (ERROR)

State	LED is:	Description
No Error	Off	No Error
Invalid Configuration	Blinking	Invalid Configuration
Unsolicited State Change	Single Flash	Local Error
Application Watchdog Timeout	Double Flash	Process Data Watchdog Timeout / EtherCAT Watchdog Timeout
Booting Error	Flashes	Booting Error
PDI Watchdog Timeout	On	Application Controller Failure

Table 5-5 Extension Module Status LED (IOS)

State	LED is:	Description
Not Powered No Expansion Module	Off	Device has no expansion module or may not be powered
Internal Bus On-line,, Do not Exchange I/O	Flashing Green	Internal Bus is normal but does not exchanging I/O data. (Passed the expansion module configuration).
Internal Bus Connection, Run Exchanging I/O	Green	Exchanging I/O data
Internal Bus Connection Fault during exchanging I/O	Red	One or more expansion module occurred in fault state. - Changed expansion module configuration. - Internal Bus communication failure.
Expansion Configuration Failed	Flashing Red	Failed to initialize expansion module - Detected invalid expansion module ID. - Overflowed Input / Output Size - Too many expansion modules - Initial protocol failure - Mismatch vendor code between Bus Coupler and expansion module.

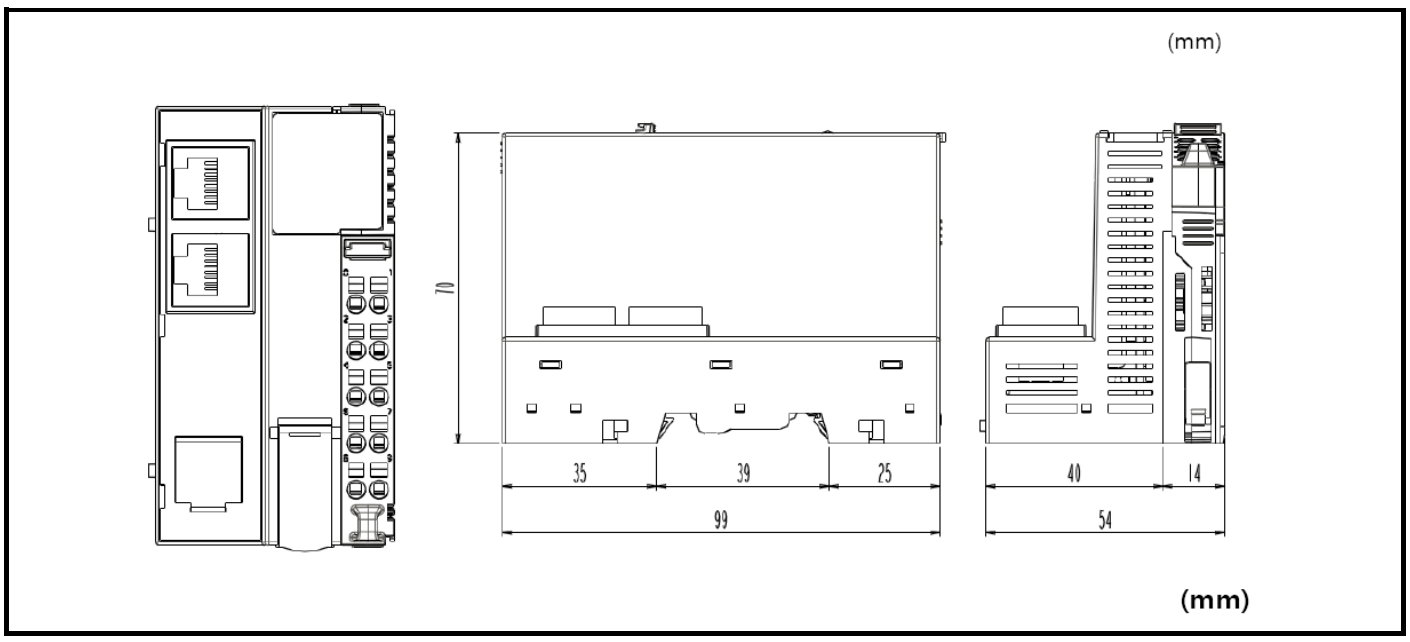
Table 5-6 Field Power / System Power Status LED

State	LED is:	Description
Not Supplied Field Power	Off	Not supplied 24 Vdc field power, 5 Vdc system power.
Supplied Field Power	Green	Supplied 24 Vdc field power, 5 Vdc system power.

Table 5-7 Indicator status and flash rates

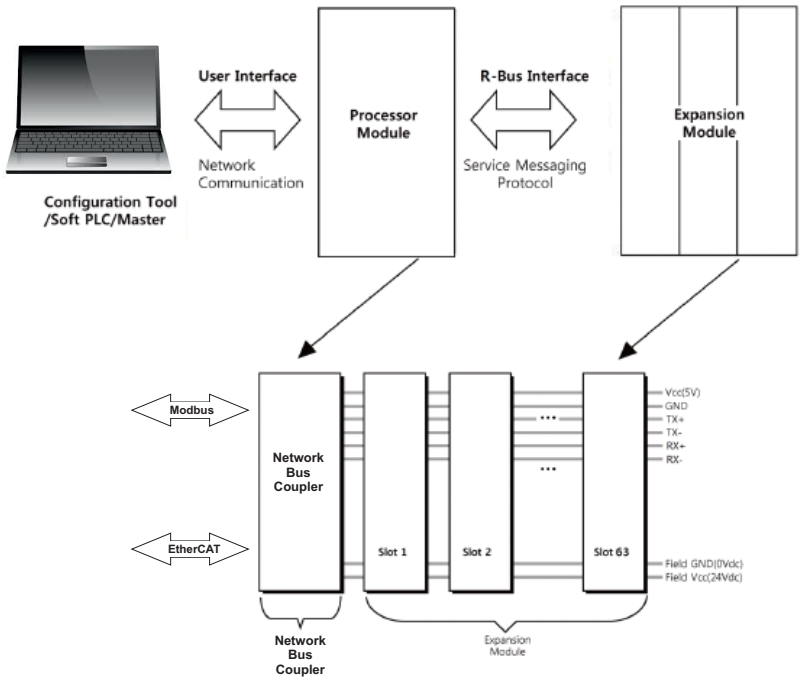
LED is:	Status
On	Constantly ON
Off	Constantly Off
Flickering	Equal ON and OFF times with a frequency of approximately 10 Hz: ON for approximately 50 ms and OFF for approximately 50 ms.
Blinking	Equal ON and OFF times with a frequency of approximately 2, 5 Hz: ON for approximately 200 ms followed by OFF for approximately 200 ms.
Single flash	One short flash (approximately 200 ms) followed by a long off phase (approximately 1000 ms)
Double flash	A sequence of two short flashes (approximately 200 ms), separated by an OFF phase (approximately 200 ms). The sequence is finished by a long OFF phase (approximately 1000 ms).
Triple flash	A sequence of three short flashes (approximately 200 ms), separated by an OFF phase (approximately 200 ms). The sequence is finished by a long off phase (approximately 1000 ms).

5.3 Dimensions



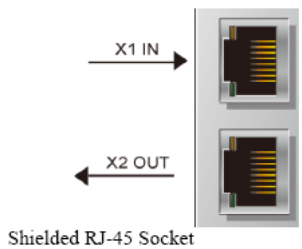
5.4 EtherCAT Electrical Interface

Figure 5-2 R-BUS System



Data is exchanged between the Fieldbus protocol and the internal R-Bus protocol.

Figure 5-3 I/O201-BC RJ45 Socket



RJ-45	Signal name	Description
1	TD+	**Transmit+**
2	TD-	**Transmit-**
3	RD+	**Receive+**
4	-	-
5	-	-
6	RD-	**Receive-**
7	-	-
8	-	-
Case	Shield	-

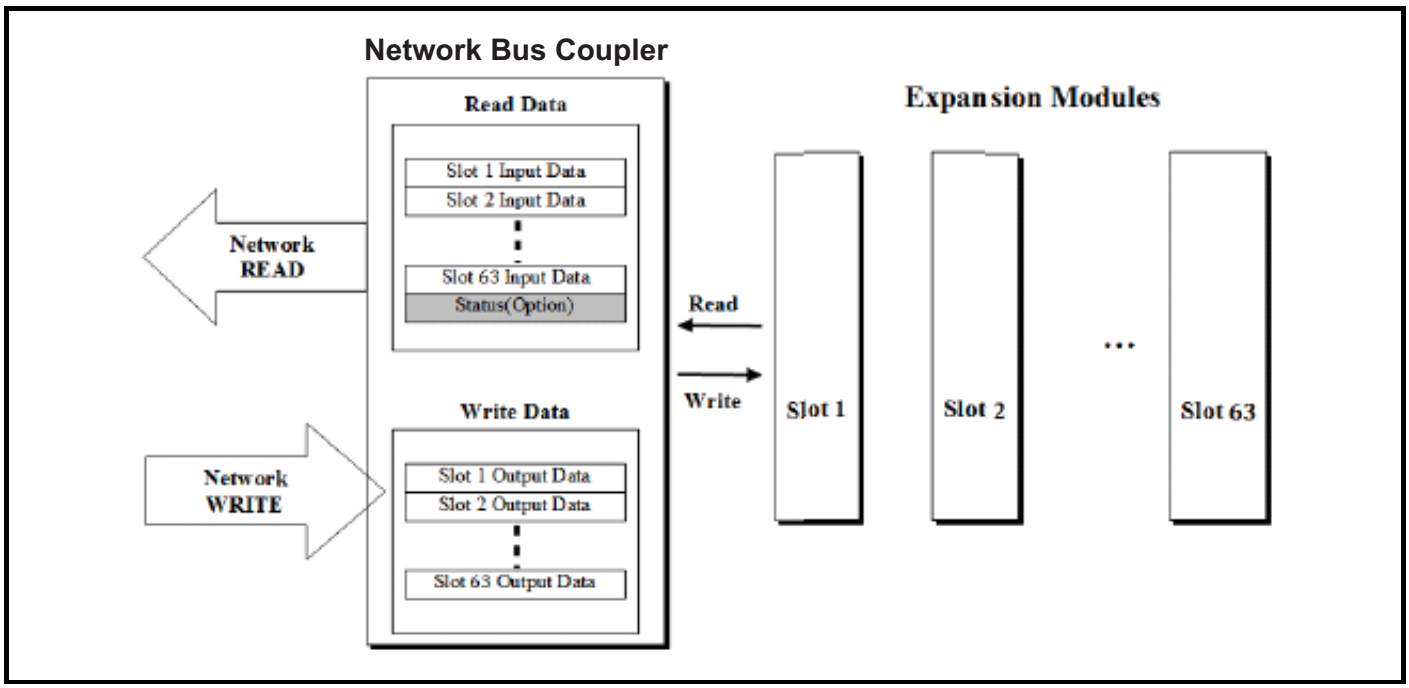
5.4.1 I/O Process Image Map

An expansion module has two types of data:

- I/O data
- Configuration parameter

The data exchange between network Bus Coupler and expansion modules is done via an I/O process image data by R-Series protocol. The following figure shows the data flow of process image between network Bus Coupler and expansion modules

Figure 5-4 Data exchange



5.5 EtherCAT Slave Information (ESI) File

For each EtherCAT Slave a device description, the so called EtherCAT Slave Information (ESI) is provided by the device's manufacturer. This is implemented in form of an XML file (eXtensible Markup Language). It describes EtherCAT specific as well as application specific features of the slave.

Control Technique ESI files can be downloaded from the Control Techniques Support Suite (https://support.controltechniques.com).

5.6 CoE Interface - parameter management in the EtherCAT system

Control, status and 10 points are available as addressable parameters following the EtherCAT index, sub-index mechanism. Such a parameter encompasses at least the following characteristics:

- Index number - for the unambiguous identification of all parameters. The index number is divided into a main index and a subindex in order to mark and arrange associated parameters.
  - Main index
  - Subindex, offset by a colon ':'
- Official name - in the form of an understandable, self-descriptive text
- Specification of changeability, e.g. whether it can only be read or can also be written
- A value - depending upon the parameter the value can be a text, a number or another parameter index.

Index Range

The relevant ranges for EtherCAT fieldbus users are:

- **0x1000**

  This is where fixed identity information for the device is stored, including name, manufacturer, serial number etc., plus information about the current and available process data configurations.
- **0x8000**

  This is where the operational and functional parameters for all channels are stored, such as filter settings or output frequency.

Other important ranges are:

- **0x4000**
  In some EtherCAT devices the channel parameters are stored here (as an alternative to the x8000 range).
- **0x6000**
  Input PDOs ("input" from the perspective of the EtherCAT master).
- **0x7000**

Output PDOs ("output" from the perspective of the EtherCAT master).

Table 5-8 Communication Objects- EtherCAT Master, I/O201-BC + RT-2328 + RT-1238

Index	Sub index	Name	Flags	Value
1000	-	Device Type	RO	0x00001389(5001)
1001	-	Error Register	RO	0x00
1008	-	Manufacturer Device Name	RO	I/O201-BC, EtherCAT
1009	-	Hardware Version	RO	I/O201-BC.v1
100A	-	Software Version	RO	1
1018	00	Identity	RO	> 5 <
	01	Vendor ID	RO	0x000000F9 (249)
	02	Product Code	RO	0x10000000
	03	Revision Number	RO	0x00010000
	04*	Serial Number	RO	0xFFFFFFFF
	05	Release Date	RO	0x20160106
10F1	00	Error Settings	RO	> 2 <
	01	Local Error Reaction	RO	0x00000000
	02	Sync Error Counter Limit	RO	0x00000004
1601	00	Slot 1, RT-2328, RxPDO	RO	> 1 <
	01	Sub Index 001	RO	0x7010:01, 8
1A02	00	Slot 2, RT-1238, TxPDO	RO	> 1 <
	01	Sub Index 001	RO	0x6020:01, 8
1C00	00	Sync Manager Type	RO	> 4 <
	01	Sub Index 001	RO	0x01
	02	Sub Index 002	RO	0x02
	03	Sub Index 003	RO	0x03
	04	Sub Index 004	RO	0x04
1C12	00	RxPDO Assign	RO	> 1 <
	01	Sub Index 001	RO	0x1601
1C13	00	TxPDO Assign	RO	> 1 <
	01	Sub Index 001	RO	0x1A02
6020	00	RT-1238 (input) 0	RO	> 1 <
	01	Byte 0	RO P	0x00
7010	00	RT-2328 (output)	RO	> 1 <
	01	Byte 0	RW P	0x00
8000	00	I/O201-BC (Parameter)	RO	> 4 <
	01	Byte 0	RW	0x00
	02	Byte 1	RW	0x00
	03	Byte 2	RW	0x00
	04	Byte 3	RW	0x00
8010	00	RT-2328 (Parameter)	RO	> 2 <
	01	Byte 0	RW	0x00
	02	Byte 1	RW	0x00
F000	00	Modular Device Profile	RO	> 2 <
	01	Module Index Distance	RO	0x0010
	02	Maximum Number Of Modules	RO	0x0040
F010	00	Module List	RO	> 3 <
	01	Sub Index 001	RO	0x00009286
	02	Sub Index 002	RO	0x00002328
	03	Sub Index 003	RO	0x00001238
F050	00	Detected Module Ident List	RO	> 2 <
	01	Sub Index 001	RO	0x10002328
	02	Sub Index 002	RO	0x10001238
	03	Sub Index 003	RO	---

5.7 I/O Module configuration

Certain I/O Modules may be configured via their internal Configuration Parameter bytes. These Configuration Parameters can be accessed via EtherCAT objects that in turn access the I/O Module's internal Configuration Parameter data bytes via the R-BUS protocol. Please refer to the relevant I/O module Configuration Parameter section for configuration bytes specific information.

The first physical I/O module's configuration object is located at object 0x8010, an offset of 0x10 is used to identify each subsequent I/O module's configuration object thereafter. Sub-index 1 represents byte 0 of the configuration, sub-index 2 represents byte 1 and so on.

Therefore to determine the configuration object associated with the desired I/O module use the following relationship:

Configuration object = 0x8010 + 0x10 X (slot position -1)

Where slot position is the enumeration of I/O Modules beginning at a value of one, and commencing from the left most location.

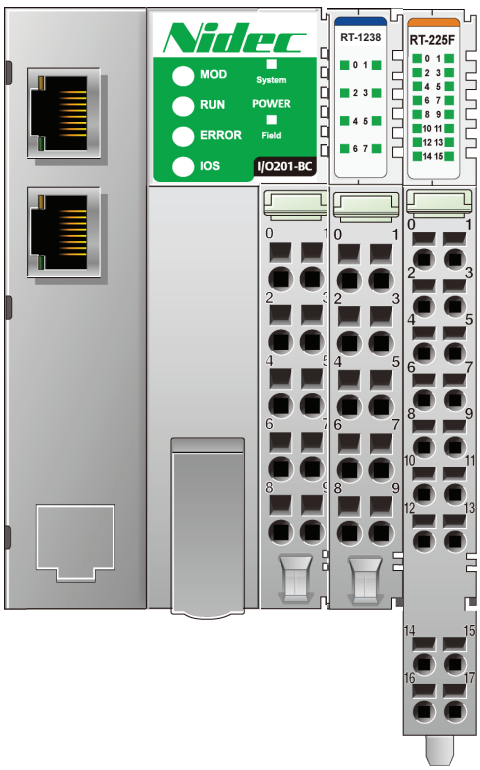
The configuration is effective immediately. I/O module configuration is saved to internal EEPROM.

5.8 EtherCAT example

5.8.1 Checking hardware fitted, configuring digital output module, and read writing to the I/O

In this example how to check the hardware, configure an I/O Module's Configuration Parameters, and read and write data using an EtherCAT master will be demonstrated. Two I/O modules are assembled with the I/O201-BC as shown below and connected to an EtherCAT master such as the MCz controller (See the MCz section of the on-line help in Machine Control Studio (MCS) for further details).

Figure 5-5 EtherCAT Network Bus Coupler with RT-1238 and RT-225F



NOTE

An EtherCAT Set-up Information (ESI) file for the I/O201-BC is required to be installed in the EtherCAT master. For the MCz, MCS is provided with the relevant ESI file pre installed.

1. Check hardware fitted

Typically the EtherCAT master will provide a diagnostic message indicating that the slaves are different to the expected arrangement if the actual hardware and order differs from the arrangement constructed in the master, therefore no further user checking is normally required. However, if further detail is required the user may interrogate objects 0xF050 and 0xF010.

Object 0xF050 is the "Detected module ident list". The last four digits of the hexadecimal number in sub-index 1 refers to the first physically present I/O module, sub-index 2 refers to the second and so on. If required the user can read the object's sub-indexes to ascertain the actual physical I/O modules present. It is usual for the format Index:sub-index to be used to define an object and sub-index, for example 0xF050:1.

Configure the EtherCAT master to perform SDO reads (Service Data Object), and read the following objects, 0xF050:1 and 0x5050:2.

Object	Value	Interpretation
0xF050:1	0x1238	RT-1238
0xF050:2	0x225F	RT-225F

Object 0xF010 is the "Module list". The hexadecimal number in sub-index 2 refers to the first I/O module defined within the master, sub-index 3 refers to the second and so on (Sub-index 1 of object 0xF010 contains the bus coupler defined in the master).

Configure the EtherCAT master to perform SDO reads (Service Data Object) and read the following objects, 0xF010:2 and 0x5010:3.

Object	Value	Interpretation
0xF010:2	0x1238	RT-1238
0xF010:3	0x225F	RT-225F

2. Configure the I/O Modules

It may be necessary for the user to configure specific I/O Modules for their requirements. This example demonstrates how to configure all of the RT-225F module's channels to turn on if a fault condition occurs. Referring to the I/O module Configuration Parameter section for the RT-225F I/O module (See section 9.12 *Parameter data* on page 139 for further information).

Bit	7	6	5	4	3	2	1	0
Channel	7	6	5	4	3	2	1	0
Byte 0	Fault action channels 0 to 7. 0 = fault value. 1 = hold last value							
Byte 1	Fault action channels 8 to 15. 0 = fault value. 1 = hold last value							
Byte 2	Fault values channels 0 to 7. 0 = Off, 1 = On							
Byte 3	Fault values channels 8 to 15. 0 = Off, 1 = On							

For this particular I/O Module the fault reaction behaviour can be influenced.

The first physical I/O Module's Configuration Parameter set is accessed through object 0x8010, the second I/O Module at object 0x8020 and so on. Sub-index 1 contains the first configuration byte, sub-index 2 the second and so on. If a particular variant of I/O Module does not have a Configuration Parameter set available, then the object will be missing from the CoE online object dictionary, in this example the first module (RT-1238 input module) has no Configuration Parameter set (as typical of an input module, it is not a configurable I/O Module), and therefore object 0x8010 is not available.

In this example the RT-225F I/O Module is the second physically installed I/O Module, and therefore its Parameter configuration object will be 0x8020. It should be noted that EtherCAT masters such as MCz have the facility to send a set of objects to the slave at start up, users may find this a convenient method of configuring their I/O.

Configure the EtherCAT master to perform SDO writes (Service Data Object) and write to objects 0x8020:1, 0x8020:2, 0x8020:3 and 0x8020:4.

Object	Value
0x8020:1	0
0x8020:2	0
0x8020:3	0xFF
0x8020:4	0xFF

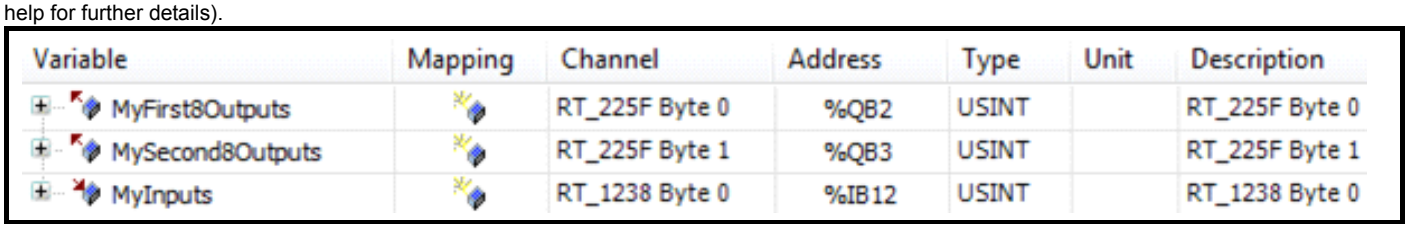
Here the values written equate to:

Byte	Value	Configuration
0	0	Fault action for channels 0 to 7 = fault value
1	0	Fault action for channels 8 to 15 = fault value
2	0xFF	Fault value for channels 0 to 7 = On
3	0xFF	Fault value for channels 8 to 15 = On

3. Read and Write to the Inputs and Outputs

The EtherCAT master will characteristically define Process Data Objects (PDOs) based on the I/O201-1 bus couplers ESI file. This will allow Byte 0 of the eight channel RT-1238, and Byte 0 and Byte 1 of the 16 channel RT-225F to be respectively read and written cyclically with minimal configuration.

The following image illustrates how the user has assigned their variables in the left most pane to the automatically created Channels within MCS for the MCz master; variables can be assigned to either the relevant byte as in this case, or individual bits within that byte (See the MCz section of MCS help for further details).



5.9 Trouble shooting

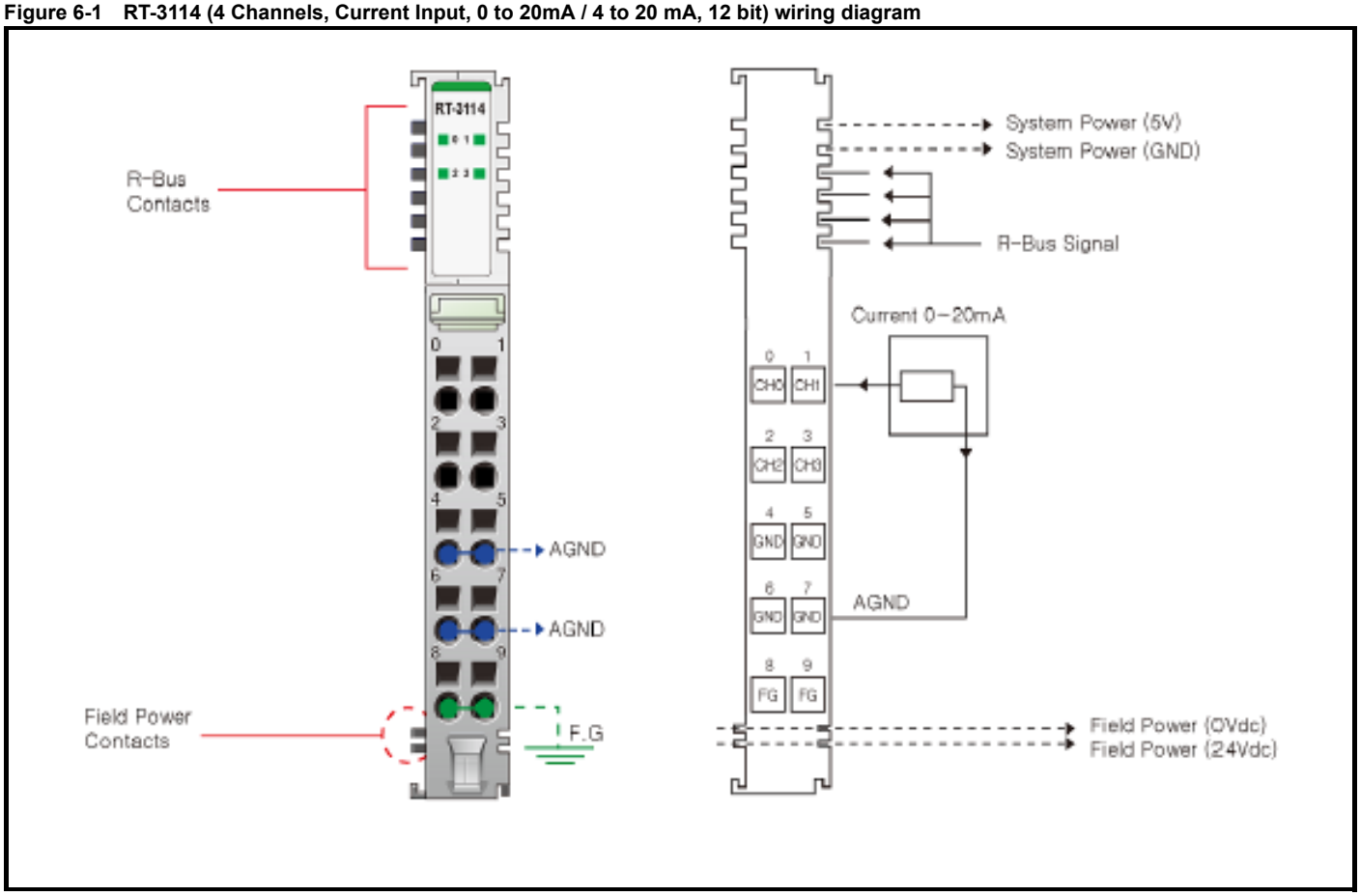
Table 5-9 How to diagnose by LED indicator

LED Status	Cause	Action
All LED turns off	No power	Check main power Cable
	System power is not supplied.	Contact supplier of the device and send module for repair.
MOD LED flashing Red	The unit has suffered a recoverable fault in self-testing. - EEPROM checksum fault	Use up to 63 I/O modules
MOD LED Red	The unit has suffered a non-recoverable fault in self-testing. - Firmware fault	Contact supplier of the device and send module for repair.
ERROR LED Blinking	Invalid Configuration	Use up to 63 I/O modules Check connector
ERROR LED Single Flash	Local Error	
ERROR LED Double Flash	Process Data Watchdog Timeout / EtherCAT Watchdog Timeout	
ERROR LED Flashes	Booting Error	
ERROR LED On	Application Controller Failure	

6 Analog Input

6.1 RT-3114 (4 Channels, Current Input, 0 to 20mA / 4 to 20 mA, 12 bit)

Figure 6-1 RT-3114 (4 Channels, Current Input, 0 to 20mA / 4 to 20 mA, 12 bit) wiring diagram



Pin number	Signal description	Signal description	Pin number
0	Input Channel 0	Input Channel 1	1
2	Input Channel 2	Input Channel 3	3
4	Input Channel Common (AGND)	Input Channel Common (AGND)	5
6	Input Channel Common (AGND)	Input Channel Common (AGND)	7
8	Field Ground	Field Ground	9

Table 6-1 Environmental specification

Environmental specifications	
Operating temperature	-20 °C to 60 °C
Storage temperature	-40 °C to 85 °C
Relative humidity	5 % to 95 % non-condensing
Operating altitude	2000 m
Mounting	DIN rail
Input specification	
Inputs Per Module	4 Channels single ended, non-isolated between channels
Resolution in Ranges	12 bits: 4.88 uA /Bit (0 to 20 mA), 3.91 uA/ Bit (4 to 20 mA)
Indicators (Logic side)	4 Green Input Status
Input Current Range	0 to 20 mA, 4 to 20 mA
Data Format	16 bits Integer (2' compliment)
Module Error	±0.1 % Full Scale @ 25 °C ambient ±0.3 % Full Scale @ -20 °C, 60 °C
Input Impedance	121.5 Ω
Diagnostic	Diagnostic Field Power Off: LED Blinking Field Power On: LED Off < 0.5 % (Maximum Input Value) Field Power On: LED On > 0.5 % (Maximum Input Value) Maximum Range Over: LED Off > 21 mA Minimum Range Over: LED Off < 3 mA (4 to 20 mA)
Conversion Time	1 ms / All channel (≤0.25 ms per channel)
Calibration	Not Required
Common Type	4 Common, Field Power 0V is Common (AGND)
General specifications	
Shock operating	IEC 60068-2-27
Vibration resistance	Sine Vibration (Based on IEC 60068-2-6) - • 5 to 25 Hz: ± 1.6 mm • 25 to 300 Hz: 4 g • Sweep Rate: 1 Oct/min, 20 Sweeps Random Vibration (Based on IEC 60068-2-64) • 10 to 40 Hz: 0.0125 g^2/ Hz • 40 to 100 Hz: 0.0125 → 0.002 g^2 /Hz • 100 to 500 Hz: 0.002 g^2/ Hz • 500 to 2000 Hz: 0.002 → 1.3 x 10-$^4g^2$/ Hz • Test time: 1 hr for each test
Industrial Emissions	EN 61000-6-4/A11: 2011
Industrial Immunity	EN 61000-6-2: 2005
Installation Position	Vertical and horizontal installation is available
Product certifications	CE, UL, FCC, KC(MSIP-REM-CV3-RT-3114)
Power Dissipation	Max. 100 mA @ 5 Vdc
Isolation	I/O to Logic: Isolation Field Power: Non-Isolatio
Field Power	Supply Voltage: 24 Vdc nominal Voltage Range: 18 to 32 Vdc Power Dissipation: Max. 30 mA@24 Vdc
Wiring	I/O Cable Max. 2.0 mm^2 (AWG 14)
Weight	58 g
Module size	12 mm x 99 mm x 70 mm

6.2 RT-3114 LED Indicator

Table 6-2 LED Indicator

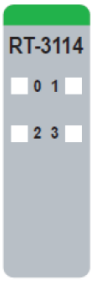
Module	LED number	LED function / description	LED colour
	0	INPUT Channel 0	Green
	1	INPUT Channel 1	
	2	INPUT Channel 2	
	3	INPUT Channel 3	

Table 6-3 Channel Status LED

Status	LED	To indicate
Normal Operation	[LED Off < 0.5 % (Maximum Input Value)] - Channel OFF [LED On > 0.5 % (Maximum Input Value)] - Channel Green	Normal Operation
Normal Operation	[LED Off > 21 mA (Maximum Range Over] – Channel OFF [LED Off < 3 mA (Minimum Range Over 4 to 20 mA)] – Channel OFF	Over range Check
Field Power Error	All Channel Repeat Green and Off	Field Power is unconnected

6.3 Data Value / Current

Table 6-4 Current Range: 0 to 20 mA

Current	0.0 mA	5.0 mA	10.0 mA	20.0 mA
Data (Hex)	H0000	H03FF	H07FF	H0FFF

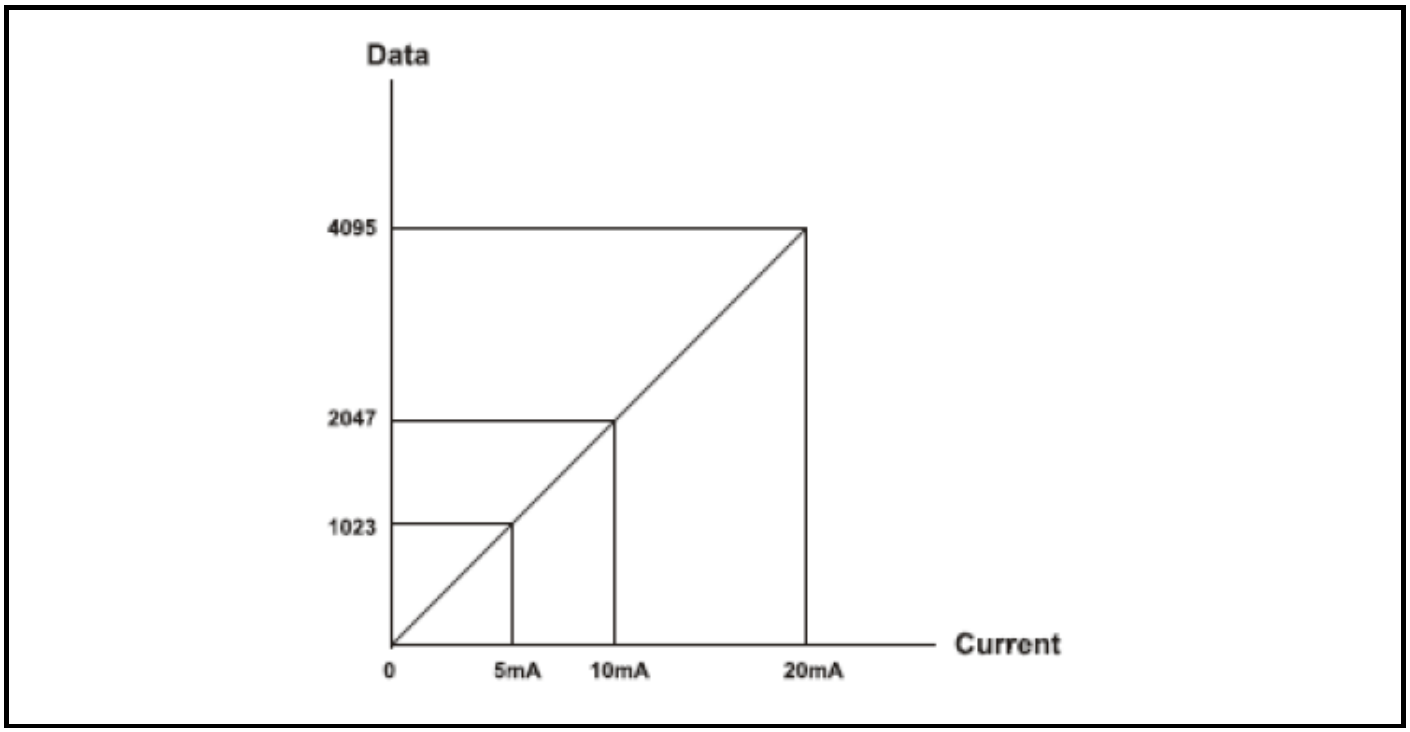
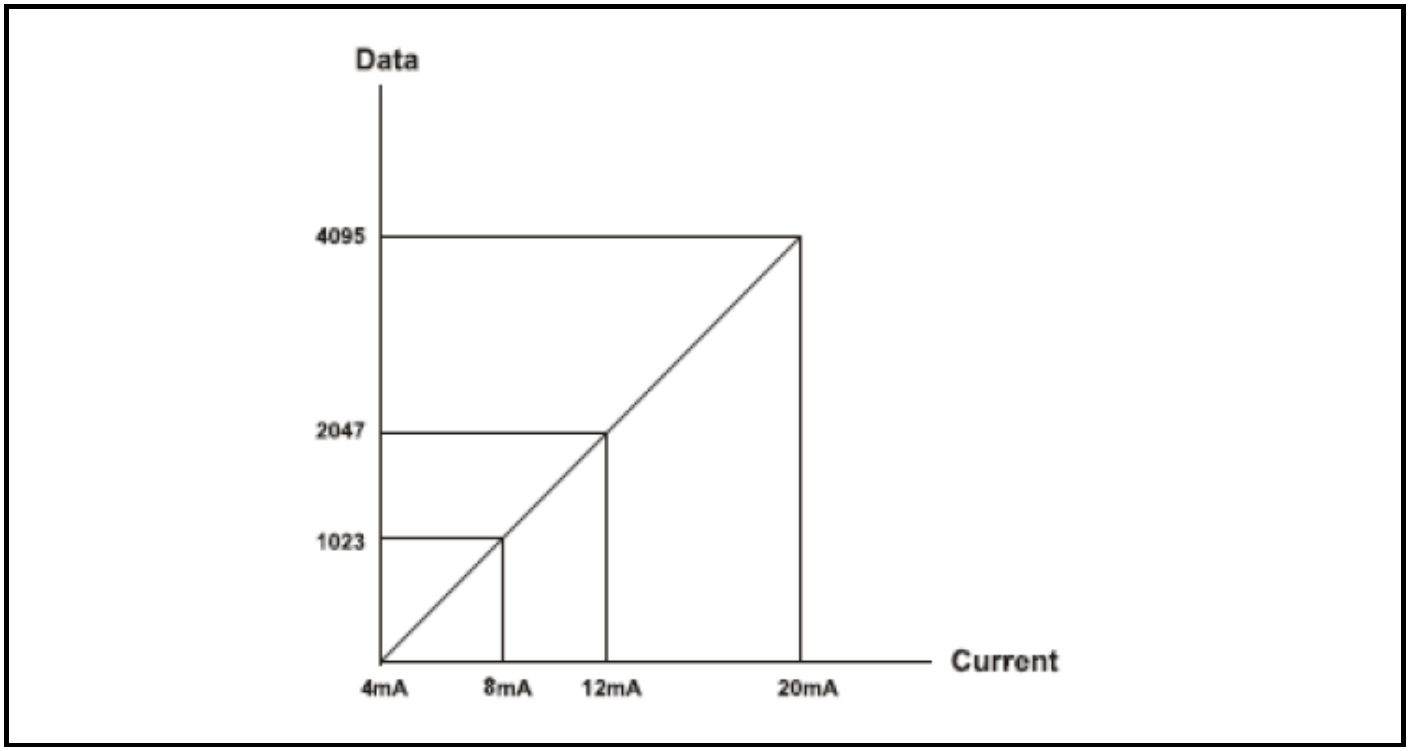


Table 6-5 Current Range: 4 to 20 mA

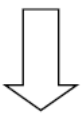
Current	4.0 mA	8.0 mA	12.0 mA	20.0 mA
Data (Hex)	H0000	H03FF	H07FF	H0FFF



6.4 Mapping data into the image table

- Input module data

Analog Input Ch0
Analog Input Ch1
Analog Input Ch2
Analog Input Ch3



- Input image value

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Analog Input Ch0 Low byte							
Byte 1	Analog Input Ch0 High byte							
Byte 2	Analog Input Ch1 Low byte							
Byte 3	Analog Input Ch1 High byte							
Byte 4	Analog Input Ch2 Low byte							
Byte 5	Analog Input Ch2 High byte							
Byte 6	Analog Input Ch3 Low byte							
Byte 7	Analog Input Ch3 High byte							

6.5 Parameter data

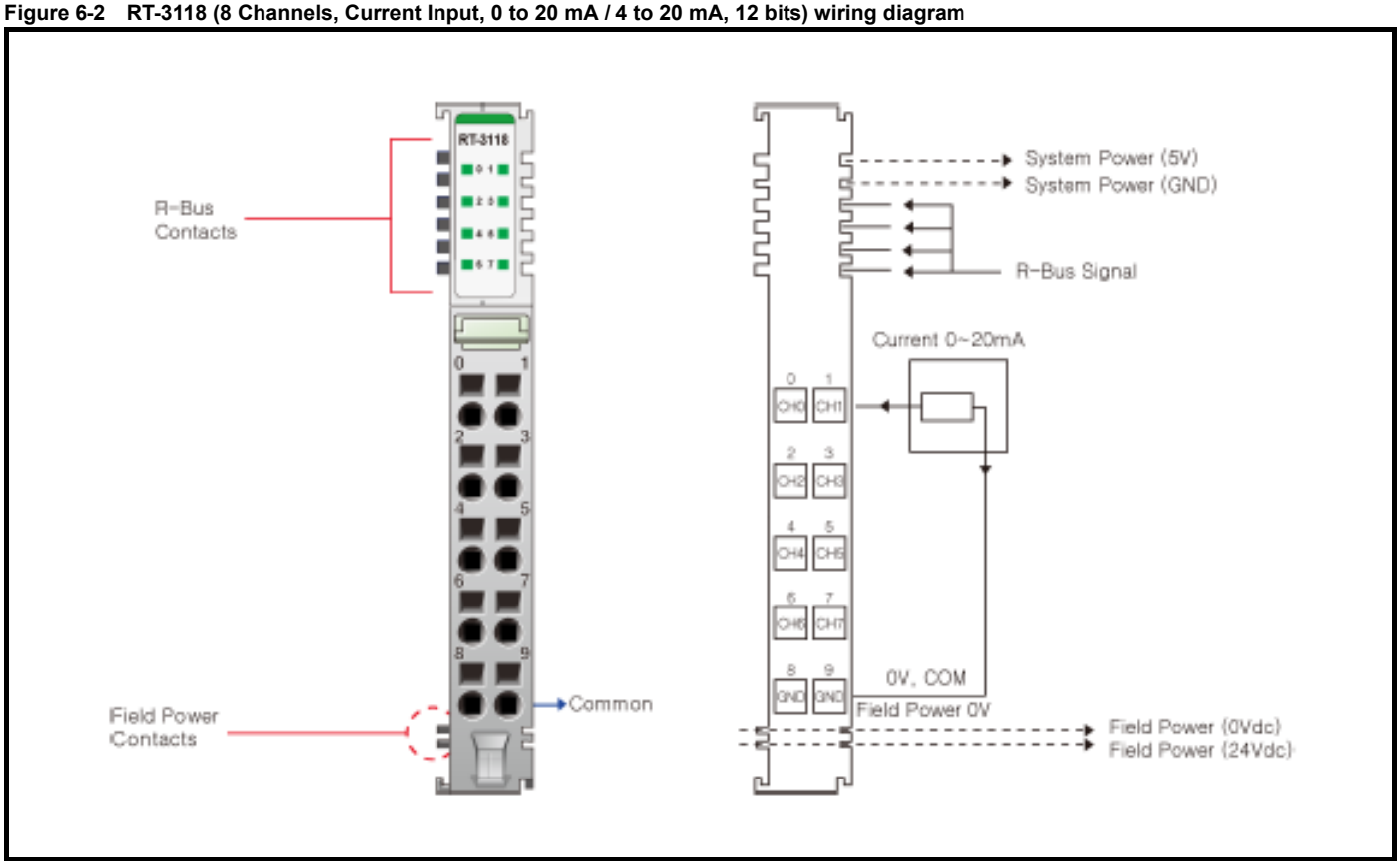
- Valid Parameter length: 6 Bytes
- Parameter data

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Current Range for Channel 0 (H00: 0 to 20 mA, H01: 4 to 20 mA)							
Byte 1	Current Range for Channel 1 (H00: 0 to 20 mA, H01: 4 to 20 mA)							
Byte 2	Current Range for Channel 2 (H00: 0 to 20 mA, H01: 4 to 20 mA)							
Byte 3	Current Range for Channel 3 (H00: 0 to 20 mA, H01: 4 to 20 mA)							
Byte 4	Filter Time (H00: Default Filter (=20) / H01: Fastest to / H62: Slowest)							
Byte 5	Not used (=00)							

All values are stored in Bus Coupler`s EEPROM.

6.6 RT-3118 (8 Channels, Current Input, 0 to 20 mA / 4 to 20 mA, 12 bit)

Figure 6-2 RT-3118 (8 Channels, Current Input, 0 to 20 mA / 4 to 20 mA, 12 bits) wiring diagram



Pin number	Signal description	Signal description	Pin number
0	Input Channel 0	Input Channel 1	1
2	Input Channel 2	Input Channel 3	3
4	Input Channel 4	Input Channel Common (AGND)	5
6	Input Channel 6	Input Channel Common (AGND)	7
8	Input Channel Common (AGND)	Input Channel Common (AGND)	9

Table 6-6 Environmental specification

Environmental specifications	
Operating temperature	-20 °C to 60 °C
Storage temperature	-40 °C to 85 °C
Relative humidity	5 % to 90 % non-condensing
Operating altitude	2000 m
Mounting	DIN rail
Input specification	
Inputs Per Module	8 Channels single ended, non-isolated between channels
Resolution in Ranges	12 bits: 4.88 uA /Bit (0 to 20 mA), 3.91 uA/ Bit (4 to 20 mA)
Indicators (Logic side)	8 Green Input Status LEDs
Input Current Range	0 to 20 mA, 4 to 20 mA
Data Format	16 bits Integer (2' compliment)
Module Error	±0.1 % Full Scale @ 25 °C ±0.3 % Full Scale @ -20 °C, 60 °C
Input Impedance	121.5 Ω
Diagnostic	Diagnostic Field Power Off: LED Blinking Field Power On: LED Off < 0.5 % (Maximum Input Value) Field Power On: LED On > 0.5 % (Maximum Input Value) Maximum Range Over: LED Off > 21 mA Minimum Range Over: LED Off < 3 mA (4 to 20 mA)
Conversion Time	≤0.25 ms per channel)
Calibration	Not Required
Common Type	8 Channels / 2 Common
General specifications	
Shock operating	IEC 60068-2-27
Vibration resistance	Sine Vibration (Based on IEC 60068-2-6) - • 5 to 25 Hz: ± 1.6 mm • 25 to 300 Hz: 4 g • Sweep Rate: 1 Oct/min, 20 Sweeps Random Vibration (Based on IEC 60068-2-64) • 10 to 40 Hz: 0.0125 g^2/ Hz • 40 to 100 Hz: 0.0125 → 0.002 g^2 /Hz • 100 to 500 Hz: 0.002 g^2/ Hz • 500 to 2000 Hz: 0.002 → 1.3 x $10^{-4}g^2$/ Hz • Test time: 1 hr for each test
EMC Resistance Burst/ESD	EN 61000-6-2: 2005 EN 61000-6-4/All: 2011
Installation Pos. / Protect. Class	Variable/IP20
Product certifications	CE, FCC, RoHS, Reach, UL, KC(MSIP-REM-CV3-RT-3118)
Power Dissipation	Max. 100 mA @ 5 Vdc
Isolation	I/O to Logic: Photocoupler Isolation Field Power: Non-Isolation
Field Power	Supply Voltage: 24 Vdc nominal Voltage Range: 18 to 32 Vdc
Wiring	I/O Cable Max. 2.0 mm^2 (AWG 14)
Weight	58 g
Module size	12 mm x 99 mm x 70 mm

6.7 RT-3118 LED Indicator

Table 6-7 LED Indicator

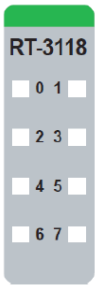
Module	LED number	LED function / description	LED colour
	0	INPUT Channel 0	Green
	1	INPUT Channel 1	
	2	INPUT Channel 2	
	3	INPUT Channel 3	
	4	INPUT Channel 4	
	5	INPUT Channel 5	
	6	INPUT Channel 6	
	7	INPUT Channel 7	

Table 6-8 Channel Status LED

Status	LED	To indicate
Normal Operation	Off	Input Value < 0.5 % (Maximum Input Value)]
	Green	Input Value > 0.5 % (Maximum Input Value)]
Over Range Check	Off	Input Value > 21 mA (Maximum Range Over)]
		Input Value < 3 mA (Minimum Range Over)]
Field Power Error	All Channel Repeat Green and Off	Field Power is unconnected

6.8 Data Value / Current

Table 6-9 Current Range: 0 to 20 mA

Current	0.0 mA	5.0 mA	10.0 mA	20.0 mA
Data (Hex)	H0000	H03FF	H07FF	H0FFF

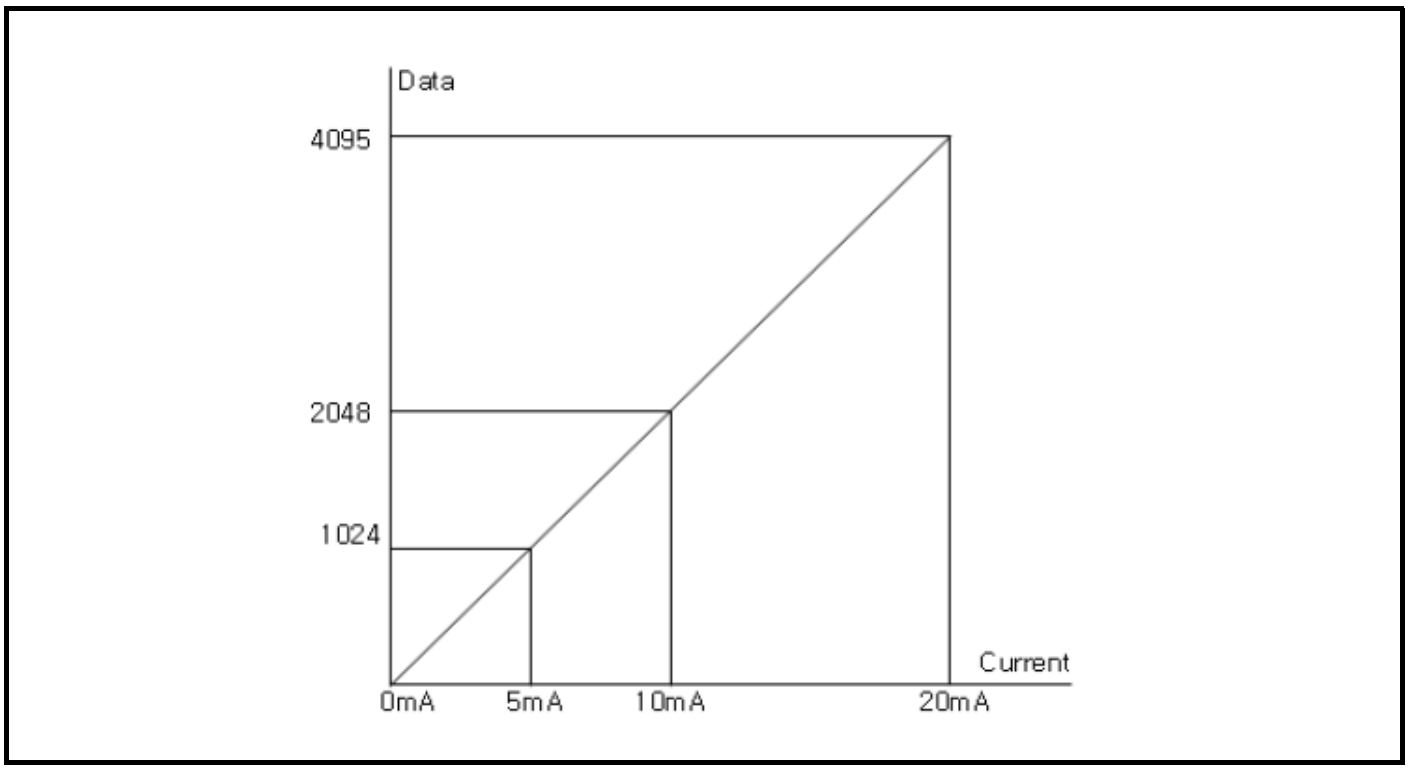
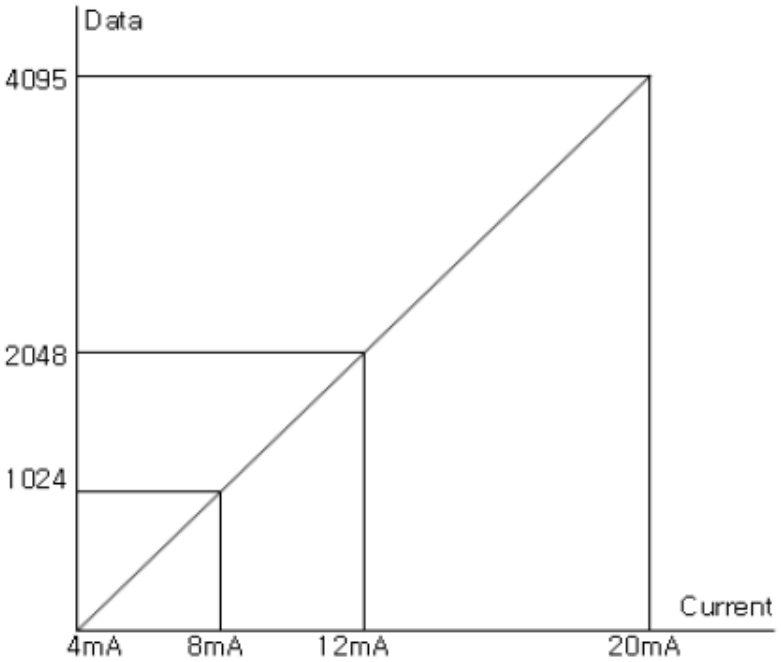


Table 6-10 Current Range: 4 to 20 mA

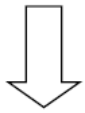
Current	4.0 mA	8.0 mA	12.0 mA	20.0 mA
Data (Hex)	H0000	H03FF	H07FF	H0FFF



6.9 Mapping data into the image table

- Input module data

Analog Input Ch0
Analog Input Ch1
Analog Input Ch2
Analog Input Ch3
Analog Input Ch4
Analog Input Ch5
Analog Input Ch6
Analog Input Ch7



- Input image value

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Analog Input Ch0 Low byte							
Byte 1	Analog Input Ch0 High byte							
Byte 2	Analog Input Ch1 Low byte							
Byte 3	Analog Input Ch1 High byte							
Byte 4	Analog Input Ch2 Low byte							
Byte 5	Analog Input Ch2 High byte							
Byte 6	Analog Input Ch3 Low byte							
Byte 7	Analog Input Ch3 High byte							
Byte 8	Analog Input Ch4 High byte							
Byte 9	Analog Input Ch4 High byte							
Byte 10	Analog Input Ch5 High byte							
Byte 11	Analog Input Ch5 High byte							
Byte 12	Analog Input Ch6 High byte							
Byte 13	Analog Input Ch6 High byte							
Byte 14	Analog Input Ch7 High byte							
Byte 15	Analog Input Ch7 High byte							

6.10 Parameter data

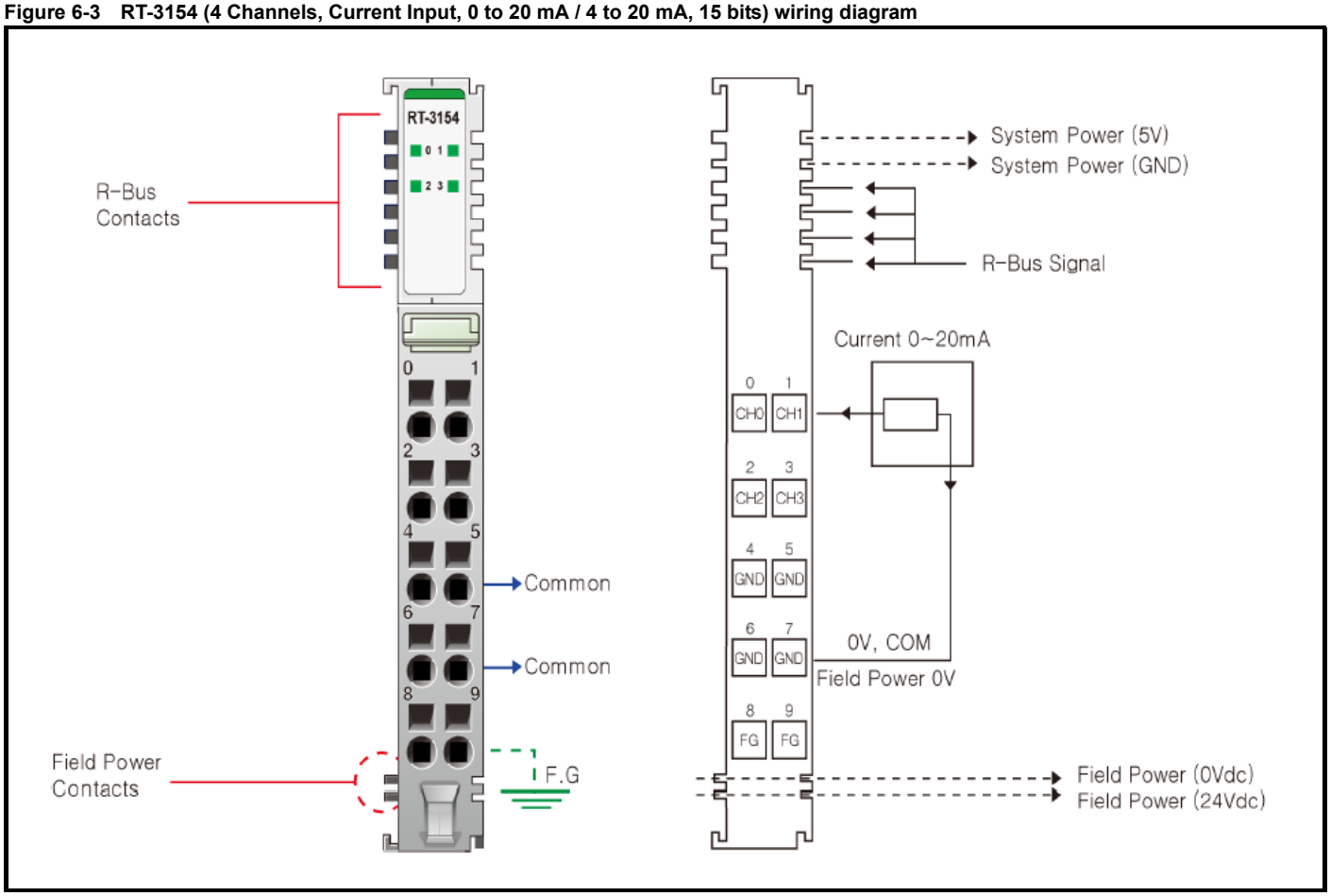
- Valid Parameter length: 6 Bytes
- Parameter data

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Current Range for Channel 0 (H00: 0 to 20 mA, H01: 4 to 20 mA)							
Byte 1	Current Range for Channel 1 (H00: 0 to 20 mA, H01: 4 to 20 mA)							
Byte 2	Current Range for Channel 2 (H00: 0 to 20 mA, H01: 4 to 20 mA)							
Byte 3	Current Range for Channel 3 (H00: 0 to 20 mA, H01: 4 to 20 mA)							
Byte 4	Current Range for Channel 4 (H00: 0 to 20 mA, H01: 4 to 20 mA)							
Byte 5	Current Range for Channel 5 (H00: 0 to 20 mA, H01: 4 to 20 mA)							
Byte 6	Current Range for Channel 6 (H00: 0 to 20 mA, H01: 4 to 20 mA)							
Byte 7	Current Range for Channel 7 (H00: 0 to 20 mA, H01: 4 to 20 mA)							
Byte 8	Filter Time (H00: Default Filter (=20) / H01: Fastest to / H62: Slowest)							
Byte 9	Not used (=00)							

All values are stored in Bus Coupler`s EEPROM.

6.11 RT-3154 (4 Channels, Current Input, 0 to 20 mA / 4 to 20 mA, 15 bits)

Figure 6-3 RT-3154 (4 Channels, Current Input, 0 to 20 mA / 4 to 20 mA, 15 bits) wiring diagram



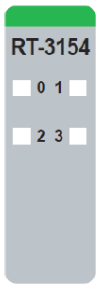
Pin number	Signal description	Signal description	Pin number
0	Input Channel 0	Input Channel 1	1
2	Input Channel 2	Input Channel 3	3
4	Input Channel Common (AGND)	Input Channel Common (AGND)	5
6	Input Channel Common (AGND)	Input Channel Common (AGND)	7
8	Field Ground	Field Ground	9

Table 6-11 Environmental specification

Environmental specifications	
Operating temperature	-20 °C to 60 °C
Storage temperature	-40 °C to 85 °C
Relative humidity	5 % to 90 % non-condensing
Operating altitude	2000 m
Mounting	DIN rail
Input specification	
Inputs Per Module	4 Channels Single Ended, Non-isolated Between Channels
Resolution in Ranges	15 bits: 0.61 uA /Bit (0 to 20 mA), 0.49 uA/ Bit (4 to 20 mA)
Indicators	4 Green Input Status LEDs
Input Current Range	0 to 20 mA, 4 to 20 mA
Data Format	16 bits Integer (2' compliment)
Module Error	±0.1 % Full Scale @ 25 °C ±0.3 % Full Scale @ -25 °C, 60 °C
Input Impedance	121.5 Ω
Diagnostic	Diagnostic Field Power Off: LED Blinking Field Power On: LED Off < 0.5 % (Maximum Input Value) Field Power On: LED On > 0.5 % (Maximum Input Value) Maximum Range Over: LED Off > 21 mA Minimum Range Over: LED Off < 3 mA (4 to 20 mA)
Conversion Time	≤0.25 ms / channel
Calibration	Not Required
Common Type	4 Channels / 4 Common
General specifications	
Shock operating	IEC 60068-2-27
Vibration resistance	Sine Vibration (Based on IEC 60068-2-6) - • 5 to 25 Hz: ± 1.6 mm • 25 to 300 Hz: 4 g • Sweep Rate: 1 Oct/min, 20 Sweeps Random Vibration (Based on IEC 60068-2-64) • 10 to 40 Hz: 0.0125 g^2/ Hz • 40 to 100 Hz: 0.0125 → 0.002 g^2 /Hz • 100 to 500 Hz: 0.002 g^2/ Hz • 500 to 2000 Hz: 0.002 → 1.3 x 10-$^4g^2$/ Hz • Test time: 1 hr for each test
EMC resistance burst/ESD	EN 61000-6-2: 2005 EN 61000-6-4/A11: 2011
Installation Pos. / Protect. Class	Variable/IP20
Product certifications	CE, FCC, RoHS, Reach, UL, KC(MSIP-REM-CV3-RT-3154)
Power Dissipation	Max. 100 mA @ 5 Vdc
Isolation	I/O to Logic: Photocoupler Isolation Field Power: Non-Isolation
Field Power	Supply Voltage: 24 Vdc nominal Voltage Range: 18 to 32 Vdc
Wiring	I/O Cable Max. 2.0 mm^2 (AWG 14)
Weight	58 g
Module size	12 mm x 99 mm x 70 mm

6.12 RT-3154 LED Indicator

6.12.1 LED Indicator

Module	LED number	LED function / description	LED colour
	0	INPUT Channel 0	Green
	1	INPUT Channel 1	
	2	INPUT Channel 2	
	3	INPUT Channel 3	

6.12.2 Channel Status LED

Status	LED	To indicate
Normal Operation	Off	Input Value < 0.5 % (Maximum Input Value)]
	Green	Input Value > 0.5 % (Maximum Input Value)]
Over Range Check	Off	Input Value > 21 mA (Maximum Range Over)]
		Input Value < 3 mA (Minimum Range Over)]
Field Power Error	All Channel Repeat Green and Off	Field Power is unconnected

6.13 Data Value / Current

Table 6-12 Current Range: 0 to 20 mA

Current	0.0 mA	5.0 mA	10.0 mA	20.0 mA
Data (Hex)	H0000	H1FFF	H3FFF	H7FFF

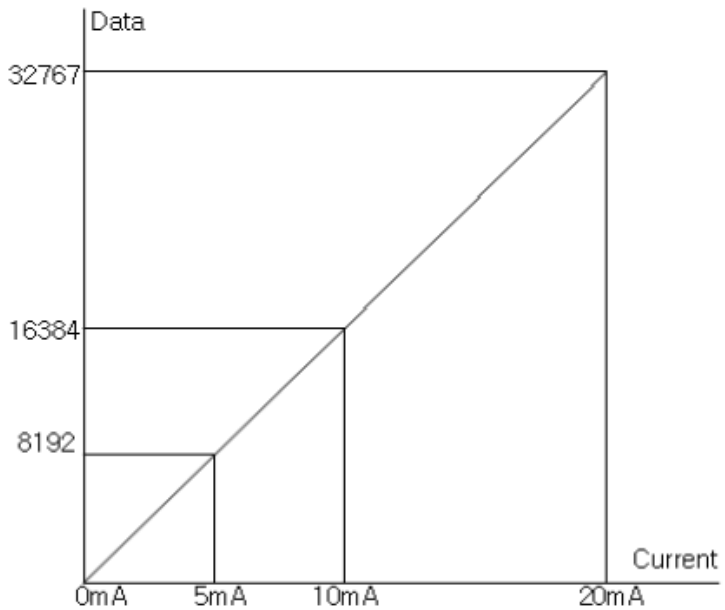
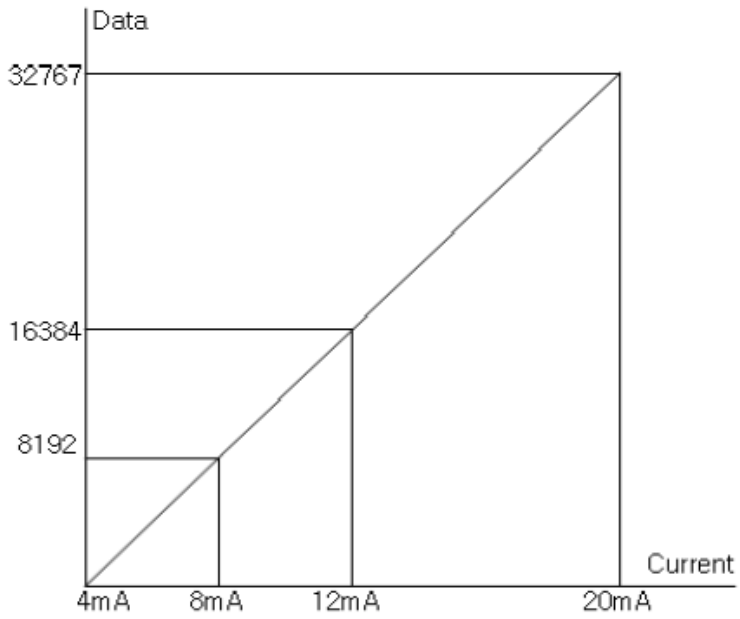


Table 6-13 Current Range: 4 to 20 mA

Current	4.0 mA	8.0 mA	12.0 mA	20.0 mA
Data (Hex)	H0000	H1FFF	H3FFF	H7FFF



6.14 Mapping data into the image table

- Input module data

Analog Input Ch0
Analog Input Ch1
Analog Input Ch2
Analog Input Ch3

- Input image value

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Analog Input Ch0 Low byte							
Byte 1	Analog Input Ch0 High byte							
Byte 2	Analog Input Ch1 Low byte							
Byte 3	Analog Input Ch1 High byte							
Byte 4	Analog Input Ch2 Low byte							
Byte 5	Analog Input Ch2 High byte							
Byte 6	Analog Input Ch3 Low byte							
Byte 7	Analog Input Ch3 High byte							

6.15 Parameter data

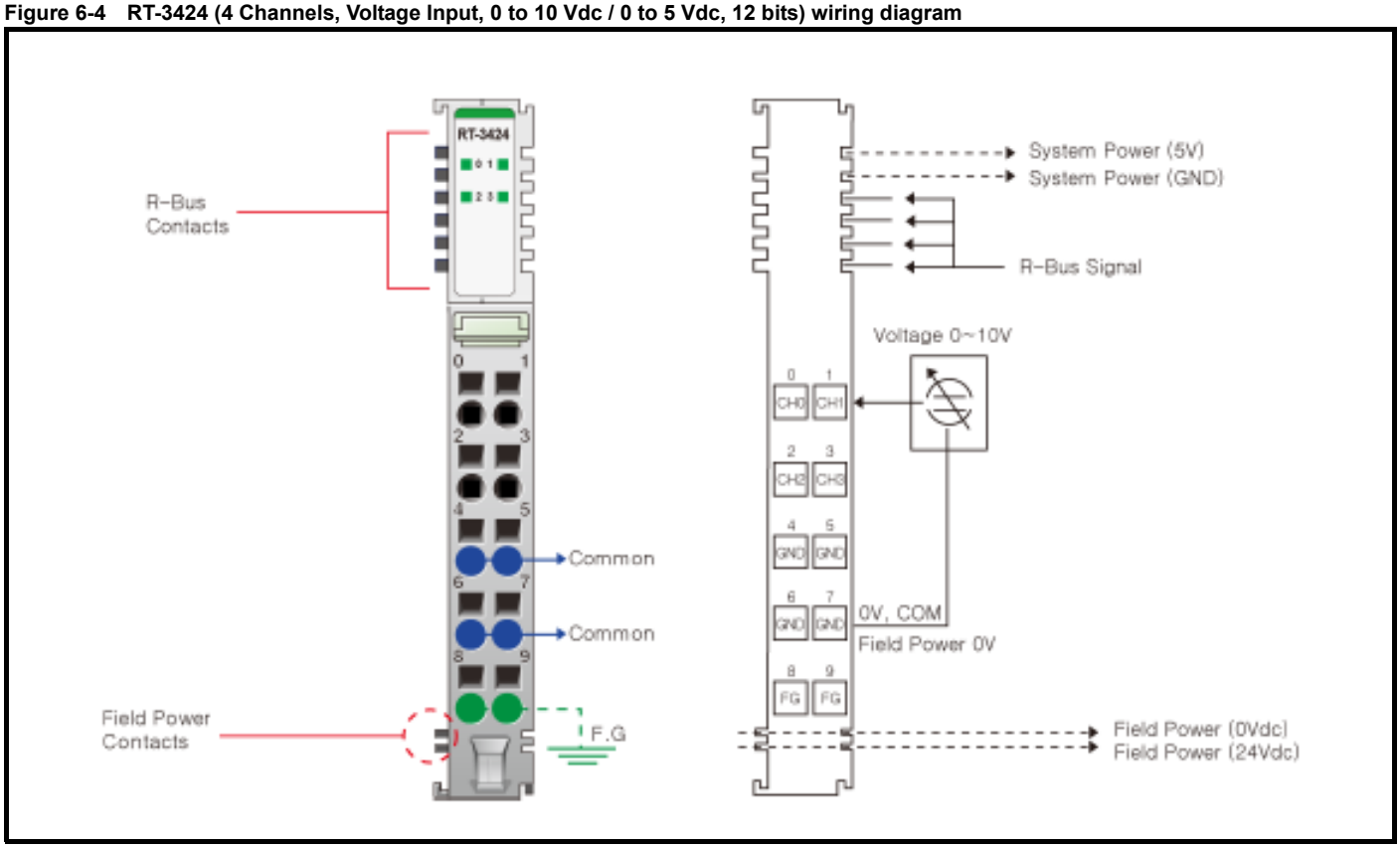
- Valid Parameter length: 6 Bytes
- Parameter data

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Current Range for Channel 0 (H00: 0 to 20 mA, H01: 4 to 20 mA)							
Byte 1	Current Range for Channel 1 (H00: 0 to 20 mA, H01: 4 to 20 mA)							
Byte 2	Current Range for Channel 2 (H00: 0 to 20 mA, H01: 4 to 20 mA)							
Byte 3	Current Range for Channel 3 (H00: 0 to 20 mA, H01: 4 to 20 mA)							
Byte 4	Filter Time (H00: Default Filter (=20) / H01: Fastest to / H62: Slowest)							
Byte 5	Not used (=00)							

All values are stored in Bus Coupler`s EEPROM.

6.16 RT-3424 (4 Channels, Voltage Input, 0 to 10 Vdc / 0 to 5 Vdc, 12 bits)

Figure 6-4 RT-3424 (4 Channels, Voltage Input, 0 to 10 Vdc / 0 to 5 Vdc, 12 bits) wiring diagram



Pin number	Signal description	Signal description	Pin number
0	Input Channel 0	Input Channel 1	1
2	Input Channel 2	Input Channel 3	3
4	Input Channel Common (AGND)	Input Channel Common (AGND)	5
6	Input Channel Common (AGND)	Input Channel Common (AGND)	7
8	Field Ground	Field Ground	9

Table 6-14 Environmental specification

Environmental specifications	
Operating temperature	-20 °C to 60 °C
Storage temperature	-40 °C to 85 °C
Relative humidity	5 % to 90 % non-condensing
Operating altitude	2000 m
Mounting	DIN rail
Input specification	
Inputs Per Module	4 Channels Single Ended, Non-isolated Between Channels
Resolution in Ranges	12 bits: 2.44 mV /Bit (0 to 10 V), 1.22 mV/ Bit (0 to 5 V)
Indicators	4 Green Input Status LEDs
Input Voltage Range	0 to 10 Vdc, 0 to 5 Vdc
Data Format	16 bits Integer (2' compliment)
Module Error	±0.1 % Full Scale @ 25 °C ±0.3 % Full Scale @ -20 °C, 60 °C
Input Impedance	500 kΩ
Diagnostic	Diagnostic Field Power Off: LED Blinking Field Power On: LED Off < 0.5 % (Maximum Input Value) Field Power On: LED On > 0.5 % (Maximum Input Value)
Conversion Time	≤0.25 ms / channel
Calibration	Not Required
Common Type	4 Channels / 4 Common
General specifications	
Shock operating	IEC 60068-2-27
Vibration resistance	Sine Vibration (Based on IEC 60068-2-6) - • 5 to 25 Hz: ± 1.6 mm • 25 to 300 Hz: 4 g • Sweep Rate: 1 Oct/min, 20 Sweeps Random Vibration (Based on IEC 60068-2-64) • 10 to 40 Hz: 0.0125 g^2/ Hz • 40 to 100 Hz: 0.0125 → 0.002 g^2 /Hz • 100 to 500 Hz: 0.002 g^2/ Hz • 500 to 2000 Hz: 0.002 → 1.3 x 10-$^4g^2$/ Hz • Test time: 1 hr for each test
EMC resistance burst/ESD	EN 61000-6-2: 2005 EN 61000-6-4/A11: 2011
Installation Pos. / Protect. Class	Variable/IP20
Product certifications	CE, FCC, RoHS, Reach, UL, KC(MSIP-REM-CV3-RT-3424)
Power Dissipation	Max. 100 mA @ 5 Vdc
Isolation	I/O to Logic: Photocoupler Isolation Field Power: Non-Isolation
Field Power	Supply Voltage: 24 Vdc nominal Voltage Range: 18 to 32 Vdc
Wiring	I/O Cable Max. 2.0 mm^2 (AWG 14)
Weight	58 g
Module size	12 mm x 99 mm x 70 mm

6.17 RT-3424 LED Indicator

Table 6-15 LED Indicator

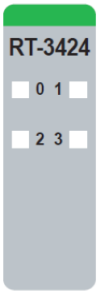
Module	LED number	LED function / description	LED colour
	0	INPUT Channel 0	Green
	1	INPUT Channel 1	
	2	INPUT Channel 2	
	3	INPUT Channel 3	

Table 6-16 Channel Status LED

Status	LED	To indicate
Normal Operation	Off	Input Value < 0.5 % (Maximum Input Value)]
	Green	Input Value > 0.5 % (Maximum Input Value)]
Field Power Error	All Channel Repeat Green and Off	Field Power is unconnected

6.18 Data Value / Voltage

Table 6-17 Current Range: 0 to 10 Vdc

Voltage	0.0 V	2.5 V	5.0 V	10.0 V
Data (Hex)	H0000	H03FF	H07FF	H0FFF

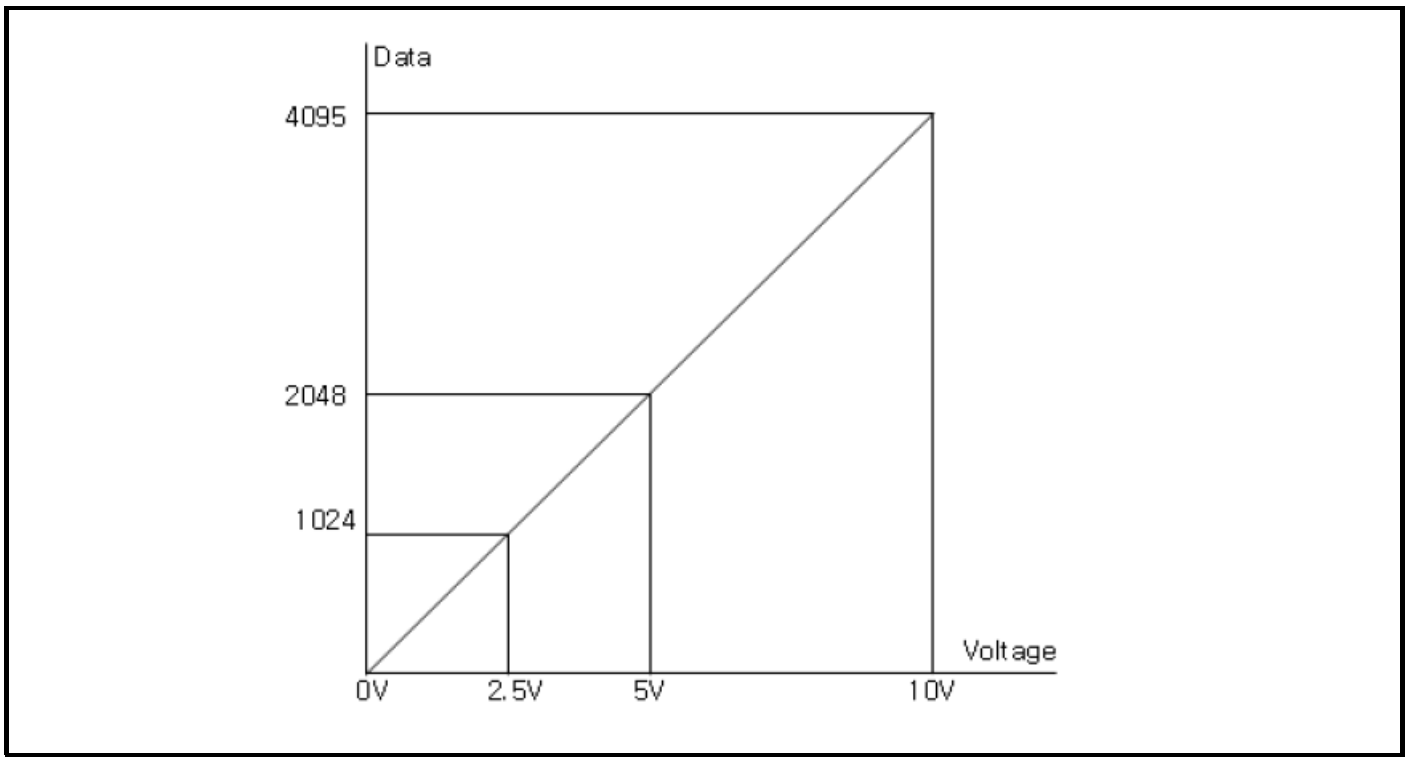
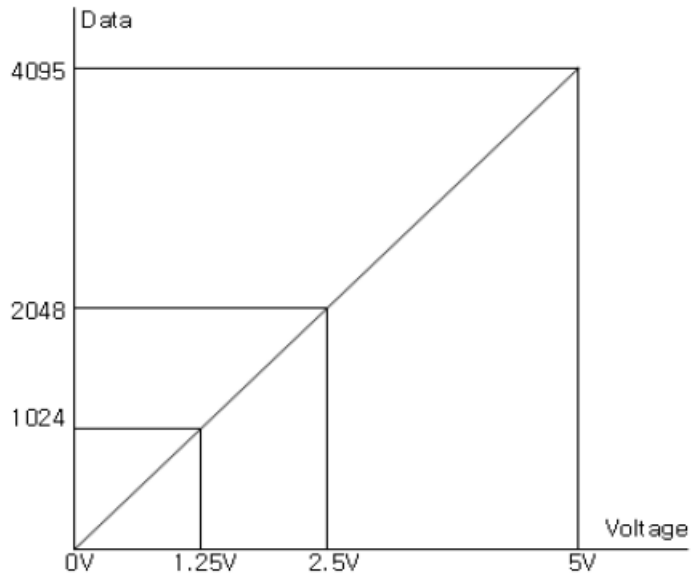


Table 6-18 Voltage Range: 0 to 5 Vdc

Voltage	0.0 V	1.25 V	2.5 V	5.0 V
Data (Hex)	H0000	H03FF	H07FF	H0FFF



6.19 Mapping data into the image table

- Input module data

Analog Input Ch0
Analog Input Ch1
Analog Input Ch2
Analog Input Ch3

- Input image value

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Analog Input Ch0 Low byte							
Byte 1	Analog Input Ch0 High byte							
Byte 2	Analog Input Ch1 Low byte							
Byte 3	Analog Input Ch1 High byte							
Byte 4	Analog Input Ch2 Low byte							
Byte 5	Analog Input Ch2 High byte							
Byte 6	Analog Input Ch3 Low byte							
Byte 7	Analog Input Ch3 High byte							

6.20 Parameter data

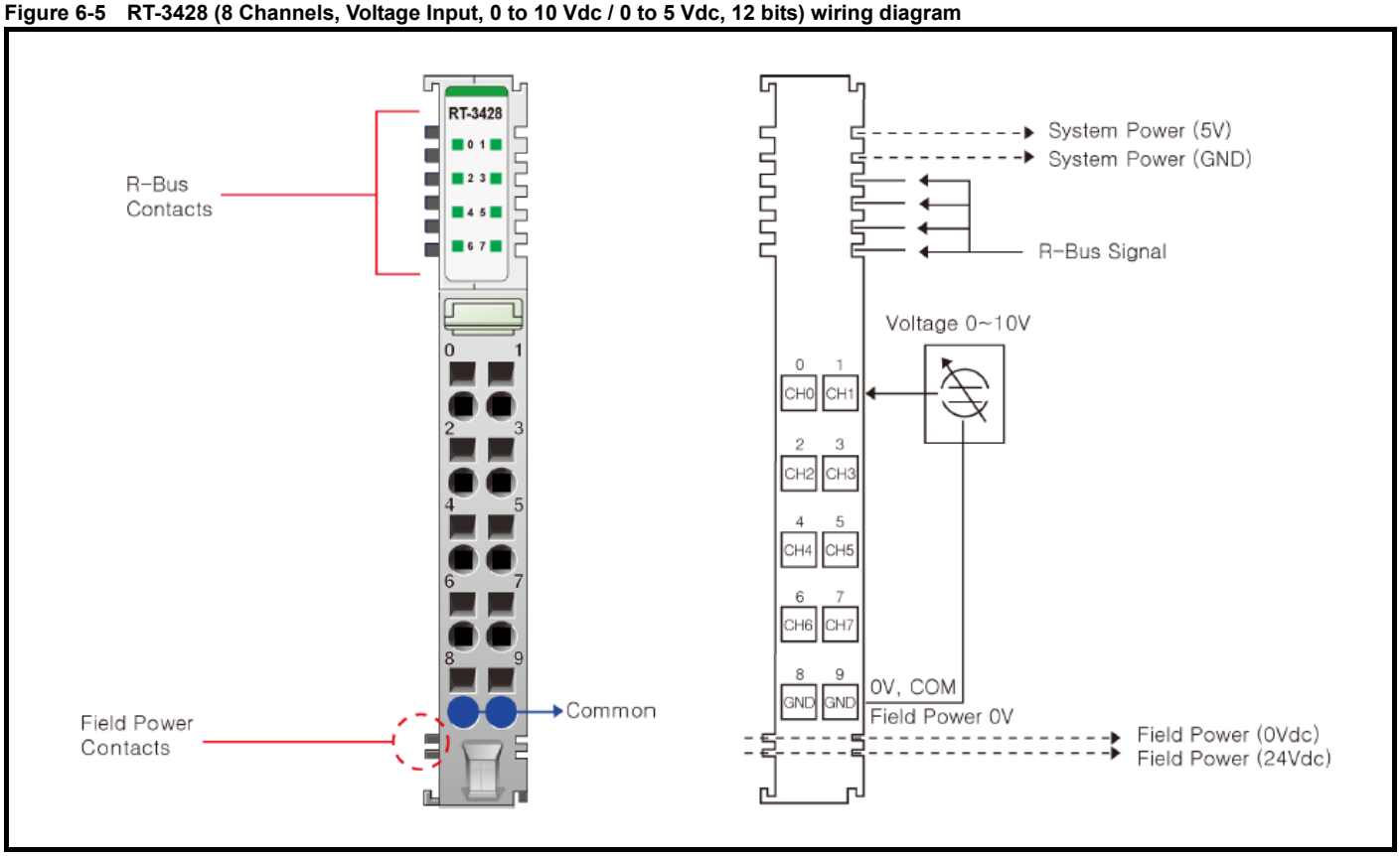
- Valid Parameter length: 6 Bytes
- Parameter data

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Current Range for Channel 0 (H00: 0 to 10 Vdc, H01: 0 to 5 Vdc)							
Byte 1	Current Range for Channel 1 (H00: 0 to 10 Vdc, H01: 0 to 5 Vdc)							
Byte 2	Current Range for Channel 2 (H00: 0 to 10 Vdc, H01: 0 to 5 Vdc)							
Byte 3	Current Range for Channel 3 (H00: 0 to 10 Vdc, H01: 0 to 5 Vdc)							
Byte 4	Filter Time (H00: Default Filter (=20) / H01: Fastest to / H62: Slowest)							
Byte 5	Not used (=00)							

All values are stored in Bus Coupler`s EEPROM.

6.21 RT-3428 (8 Channels, Voltage Input, 0 to 10 Vdc / 0 to 5 Vdc, 12 bits)

Figure 6-5 RT-3428 (8 Channels, Voltage Input, 0 to 10 Vdc / 0 to 5 Vdc, 12 bits) wiring diagram



Pin number	Signal description	Signal description	Pin number
0	Input Channel 0	Input Channel 1	1
2	Input Channel 2	Input Channel 3	3
4	Input Channel 4	Input Channel 5	5
6	Input Channel 6	Input Channel 7	7
8	Input Channel Common (AGND)	Input Channel Common (AGND)	9

6.22 RT-3428 LED Indicator

Table 6-19 LED Indicator

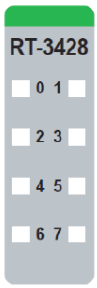
Module	LED number	LED function / description	LED colour
	0	INPUT Channel 0	Green
	1	INPUT Channel 1	
	2	INPUT Channel 2	
	3	INPUT Channel 3	
	4	INPUT Channel 4	
	5	INPUT Channel 5	
	6	INPUT Channel 6	
	7	INPUT Channel 7	

Table 6-20 Channel Status LED

Status	LED	To indicate
Normal Operation	Off	[LED Off < 0.5 % (Maximum Input Value)]
	Green	[LED On > 0.5 % (Maximum Input Value)]
Field Power Error	All Channel Repeat Green and Off	Field Power is unconnected

6.23 Data Value / Voltage

Table 6-21 Current Range: 0 to 10 Vdc

Voltage	0.0 V	2.5 V	5.0 V	10.0 V
Data (Hex)	H0000	H03FF	H07FF	H0FFF

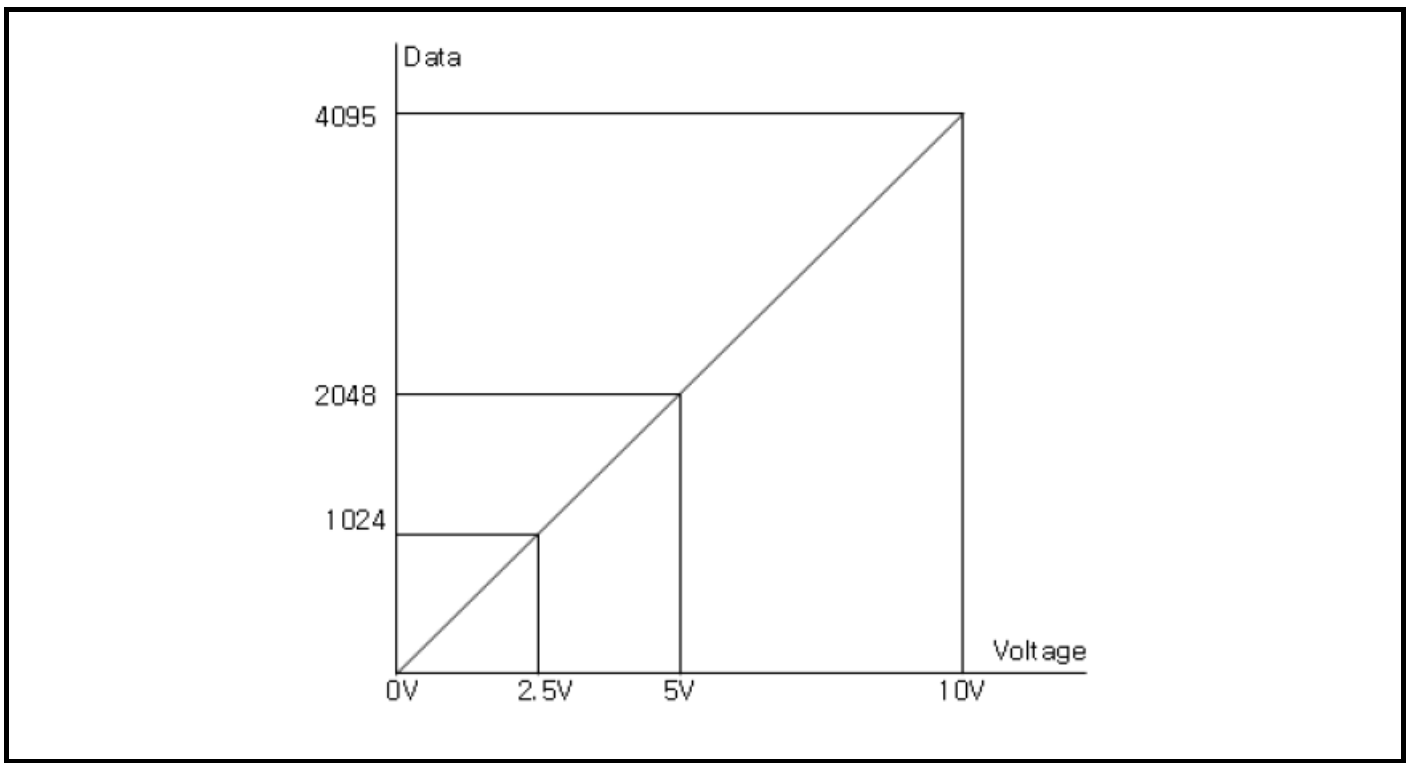
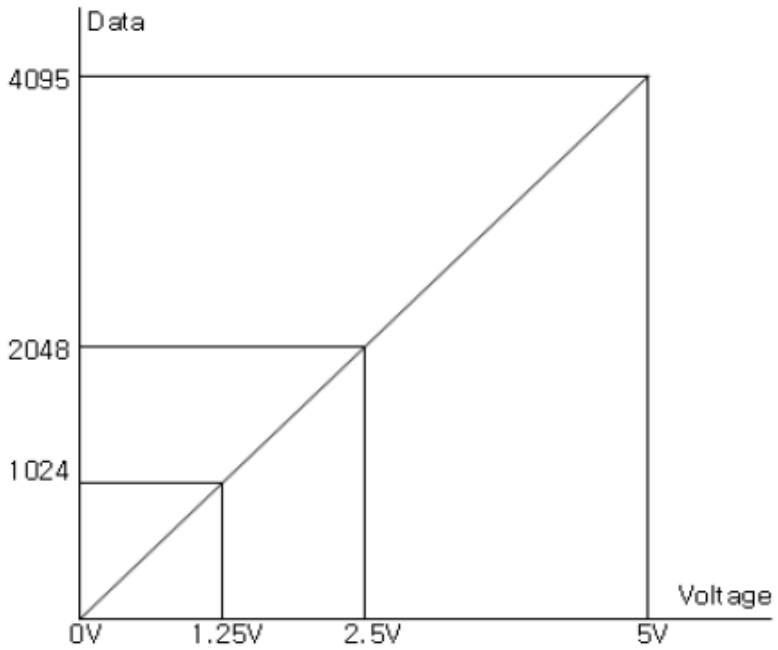


Table 6-22 Voltage Range: 0 to 5 Vdc

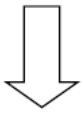
Voltage	0.0 V	1.25 V	2.5 V	5.0 V
Data (Hex)	H0000	H03FF	H07FF	H0FFF



6.24 Mapping data into the image table

- Input module data

Analog Input Ch0
Analog Input Ch1
Analog Input Ch2
Analog Input Ch3
Analog Input Ch4
Analog Input Ch5
Analog Input Ch6
Analog Input Ch7



- Input image value

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Analog Input Ch0 Low byte							
Byte 1	Analog Input Ch0 High byte							
Byte 2	Analog Input Ch1 Low byte							
Byte 3	Analog Input Ch1 High byte							
Byte 4	Analog Input Ch2 Low byte							
Byte 5	Analog Input Ch2 High byte							
Byte 6	Analog Input Ch3 Low byte							
Byte 7	Analog Input Ch3 High byte							
Byte 8	Analog Input Ch4 High byte							
Byte 9	Analog Input Ch4 High byte							
Byte 10	Analog Input Ch5 High byte							
Byte 11	Analog Input Ch5 High byte							
Byte 12	Analog Input Ch6 High byte							
Byte 13	Analog Input Ch6 High byte							
Byte 14	Analog Input Ch7 High byte							
Byte 15	Analog Input Ch7 High byte							

6.25 Parameter data

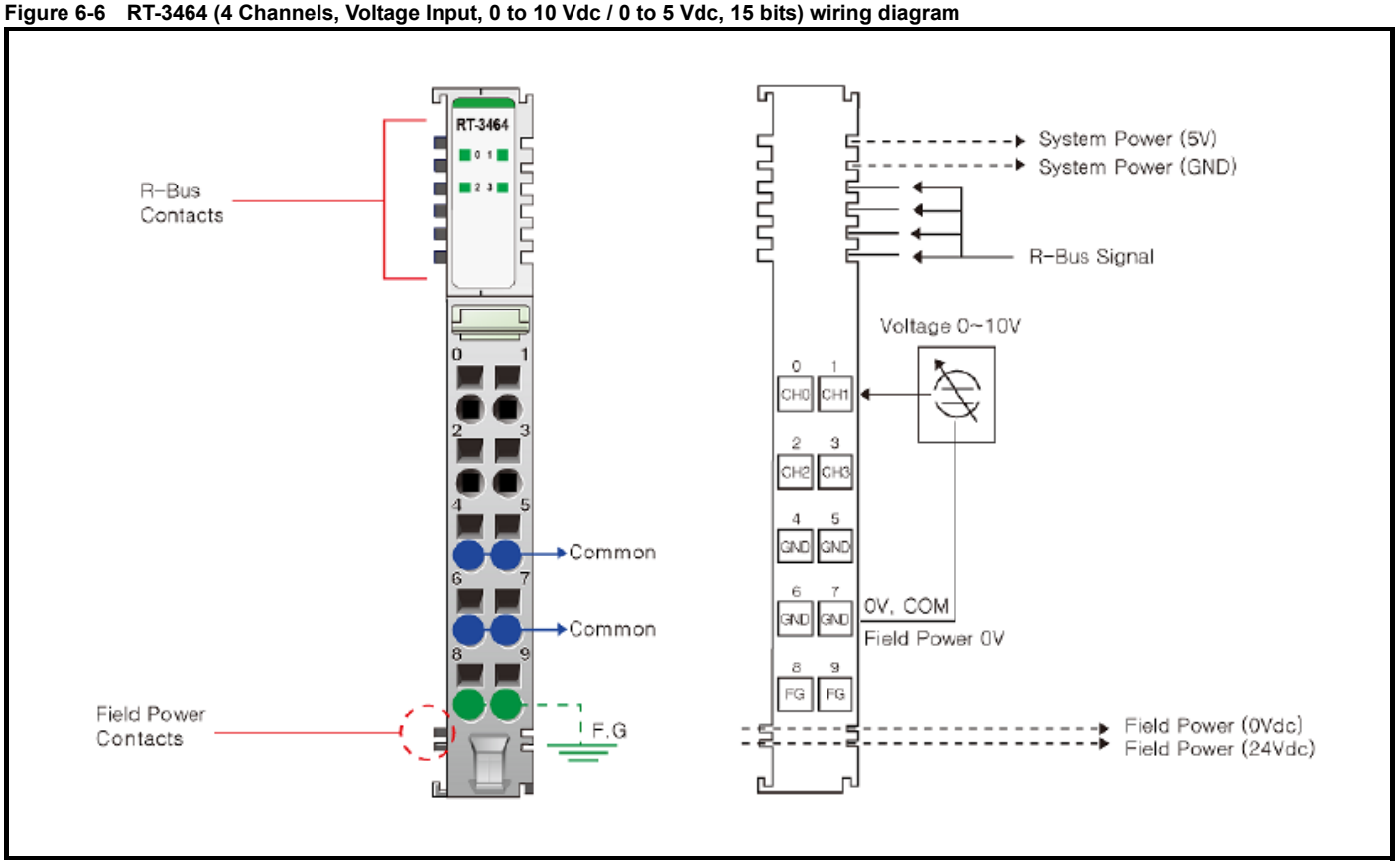
- Valid Parameter length: 10 Bytes
- Parameter data

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Current Range for Channel 0 (H00: 0 to 10 Vdc, H01: 0 to 5 Vdc)							
Byte 1	Current Range for Channel 1 (H00: 0 to 10 Vdc, H01: 0 to 5 Vdc)							
Byte 2	Current Range for Channel 2 (H00: 0 to 10 Vdc, H01: 0 to 5 Vdc)							
Byte 3	Current Range for Channel 3 (H00: 0 to 10 Vdc, H01: 0 to 5 Vdc)							
Byte 4	Current Range for Channel 4 (H00: 0 to 10 Vdc, H01: 0 to 5 Vdc)							
Byte 5	Current Range for Channel 5 (H00: 0 to 10 Vdc, H01: 0 to 5 Vdc)							
Byte 6	Current Range for Channel 6 (H00: 0 to 10 Vdc, H01: 0 to 5 Vdc)							
Byte 7	Current Range for Channel 7 (H00: 0 to 10 Vdc, H01: 0 to 5 Vdc)							
Byte 8	Filter Time (H00: Default Filter (=20) / H01: Fastest to / H62: Slowest)							
Byte 9	Not used (=00)							

All values are stored in Bus Coupler`s EEPROM.

6.26 RT-3464 (4 Channels, Voltage Input, 0 to 10 Vdc / 0 to 5 Vdc, 15 bits)

Figure 6-6 RT-3464 (4 Channels, Voltage Input, 0 to 10 Vdc / 0 to 5 Vdc, 15 bits) wiring diagram



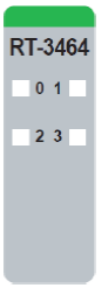
Pin number	Signal description	Signal description	Pin number
0	Input Channel 0	Input Channel 1	1
2	Input Channel 2	Input Channel 3	3
4	Input Channel Common (AGND)	Input Channel Common (AGND)	5
6	Input Channel Common (AGND)	Input Channel Common (AGND)	7
8	Field Ground	Field Ground	9

Table 6-23 Environmental specification

Environmental specifications	
Operating temperature	-20 °C to 60 °C
Storage temperature	-40 °C to 85 °C
Relative humidity	5 % to 90 % non-condensing
Operating altitude	2000 m
Mounting	DIN rail
Input specification	
Inputs Per Module	4 Channels Single Ended, Non-isolated Between Channels
Resolution in Ranges	15 bits: 0.31 mV/ bit (0 to 10 V) 0.15 mV/ bit (0 to 5 V)
Indicators	4 Green Input Status LEDs
Input Voltage Range	0 to 10 Vdc, 0 to 5 Vdc
Data Format	16 bits Integer (2' compliment)
Module Error	±0.1 % Full Scale @ 25 °C ±0.3 % Full Scale @ -25 °C, 60 °C
Input Impedance	500 kΩ
Diagnostic	Diagnostic Field Power Off : LED Blinking Field Power On: LED Off < 0.5 % (Maximum Input Value) Field Power On: LED On > 0.5 % (Maximum Input Value)
Conversion Time	≤0.25 ms / channel
Calibration	Not Required
Common Type	4 Channels / 4 Common
General specifications	
Shock operating	IEC 60068-2-27
Vibration resistance	Sine Vibration (Based on IEC 60068-2-6) - • 5 to 25 Hz: ± 1.6 mm • 25 to 300 Hz: 4 g • Sweep Rate: 1 Oct/min, 20 Sweeps Random Vibration (Based on IEC 60068-2-64) • 10 to 40 Hz: 0.0125 g^2/ Hz • 40 to 100 Hz: 0.0125 → 0.002 g^2 /Hz • 100 to 500 Hz: 0.002 g^2/ Hz • 500 to 2000 Hz: 0.002 → 1.3 x 10-$^4g^2$/ Hz • Test time: 1 hr for each test
EMC resistance burst/ESD	EN 61000-6-2: 2005 EN 61000-6-4/A11: 2011
Installation Pos. / Protect. Class	Variable/IP20
Product certifications	CE, FCC, RoHS, Reach, UL, KC(MSIP-REM-CV3-RT-3464)
Power Dissipation	Max. 100 mA @ 5 Vdc
Isolation	I/O to Logic: Photocoupler Isolation Field Power: Non-Isolation
Field Power	Supply Voltage: 24 Vdc nominal Voltage Range: 18 to 32 Vdc
Wiring	I/O Cable Max. 2.0 mm^2 (AWG 14)
Weight	58 g
Module size	12 mm x 99 mm x 70 mm

6.27 RT-3464 LED Indicator

6.27.1 LED Indicator

Module	LED number	LED function / description	LED colour
	0	INPUT Channel 0	Green
	1	INPUT Channel 1	
	2	INPUT Channel 2	
	3	INPUT Channel 3	

6.27.2 Channel Status LED

Status	LED	To indicate
Normal Operation	Off	[LED Off < 0.5 % (Maximum Input Value)]
	Green	[LED On > 0.5 % (Maximum Input Value)]
Field Power Error	All Channel Repeat Green and Off	Field Power is unconnected

6.28 Data Value / Voltage

Table 6-24 Voltage Range: 0 to 10 Vdc

Current	0.0 V	2.5 V	5.0 V	10.0 V
Data (Hex)	H0000	H1FFF	H3FFF	H7FFF

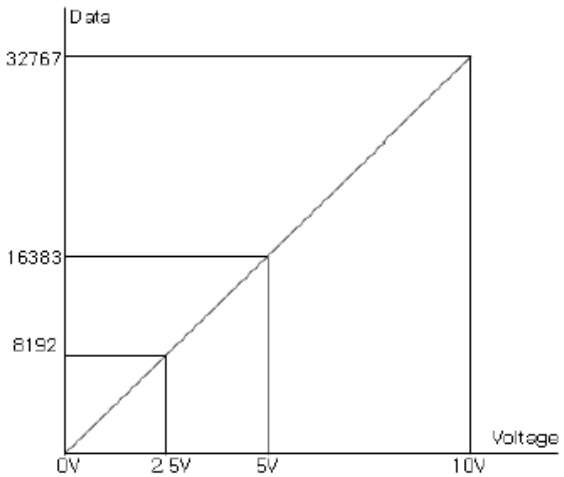
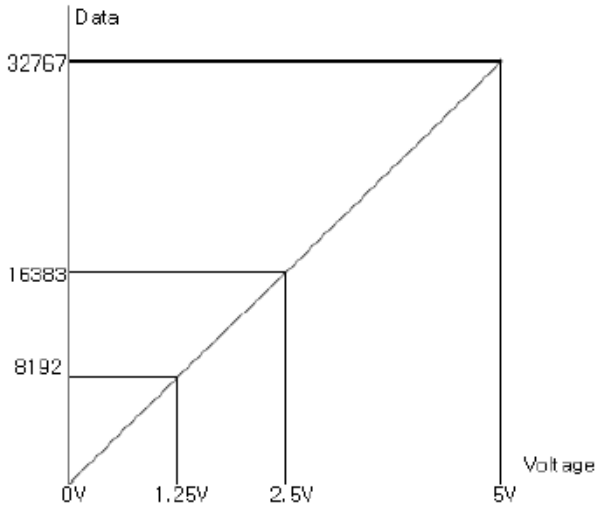


Table 6-25 Voltage Range: 0 to 5 Vdc

Voltage	0.0 V	1.25 V	2.5 V	5.0 V
Data (Hex)	H0000	H1FFF	H3FFF	H7FFF



6.29 Mapping data into the image table

- Input module data

Analog Input Ch0
Analog Input Ch1
Analog Input Ch2
Analog Input Ch3

- Input image value

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Analog Input Ch0 Low byte							
Byte 1	Analog Input Ch0 High byte							
Byte 2	Analog Input Ch1 Low byte							
Byte 3	Analog Input Ch1 High byte							
Byte 4	Analog Input Ch2 Low byte							
Byte 5	Analog Input Ch2 High byte							
Byte 6	Analog Input Ch3 Low byte							
Byte 7	Analog Input Ch3 High byte							

6.30 Parameter data

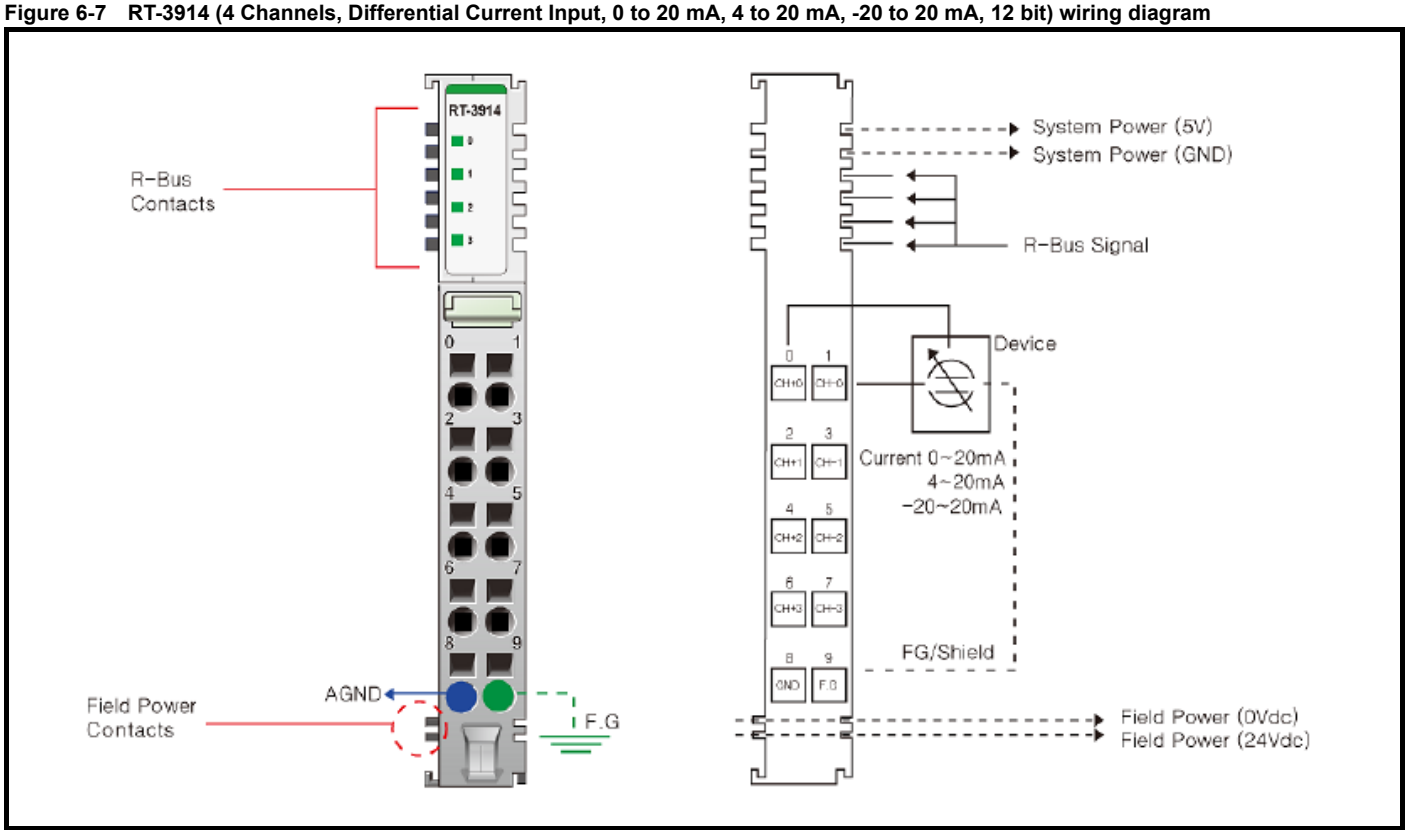
- Valid Parameter length: 6 Bytes
- Parameter data

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Current Range for Channel 0 (H00: 0 to 10 Vdc, H01: 0 to 5 Vdc)							
Byte 1	Current Range for Channel 1 (H00: 0 to 10 Vdc, H01: 0 to 5 Vdc)							
Byte 2	Current Range for Channel 2 (H00: 0 to 10 Vdc, H01: 0 to 5 Vdc)							
Byte 3	Current Range for Channel 3 (H00: 0 to 10 Vdc, H01: 0 to 5 Vdc)							
Byte 4	Filter Time (H00: Default Filter (=20) / H01: Fastest to / H62: Slowest)							
Byte 5	Not used (=00)							

All values are stored in Bus Coupler`s EEPROM.

6.31 RT-3914 (4 Channels, Differential Current Input, 0 to 20 mA, 4 to 20 mA, -20 to 20 mA, 12 bit)

Figure 6-7 RT-3914 (4 Channels, Differential Current Input, 0 to 20 mA, 4 to 20 mA, -20 to 20 mA, 12 bit) wiring diagram



Pin number	Signal description	Signal description	Pin number
0	Input Channel 0 (+)	Input Channel 0 (-)	1
2	Input Channel 1 (+)	Input Channel 1 (-)	3
4	Input Channel 2 (+)	Input Channel 2 (-)	5
6	Input Channel 3 (+)	Input Channel 3 (-)	7
8	Input Channel Common (AGND)	Field Ground	9

Table 6-26 Environmental specification

Environmental specifications	
Operating temperature	-20 °C to 60 °C
Storage temperature	-40 °C to 85 °C
Relative humidity	5 % to 90 % non-condensing
Operating altitude	2000 m
Mounting	DIN rail
Input specification	
Inputs Per Module	4 Channels Differential, non-isolated between channels
Resolution in Ranges	12 bits: 4.88 uA / bit (0 to 20 mA) 12 bits: 3.91 uA / bit (4 to 20 mA) 12 bits: 9.77 uA / bit (-20 to 20 mA)
Indicators	4 Green Input Status LEDs
Input Range	0 to 20 mA, 4 to 20 mA, -20 to 20 mA
Data Format	16 bits Integer (2' compliment)
Module Error	±0.1 % Full Scale @ 25 °C ±0.3 % Full Scale @ -20 °C, 60 °C
Input Impedance	121.5 Ω
Diagnostic	Field Power Off: LED Blinking Field Power On: LED Off < 0.5 % (Maximum Input Value) Field Power On: LED On > 0.5 % (Maximum Input Value) Maximum Range Over: LED Off > 21 mA Minimum Range Over: LED Off < 3 mA (4 to 20 mA) Minimum Range Over: LED Off <-21 mA (-20 to 20 mA)
Conversion Time	1 msec / 4 channels
Calibration	Not Required
Common Type	4 Channels / 1 Common
General specifications	
Shock operating	IEC 60068-2-27
Vibration resistance	Sine Vibration (Based on IEC 60068-2-6) - • 5 to 25 Hz: ± 1.6 mm • 25 to 300 Hz: 4 g • Sweep Rate: 1 Oct/min, 20 Sweeps Random Vibration (Based on IEC 60068-2-64) • 10 to 40 Hz: 0.0125 g^2/ Hz • 40 to 100 Hz: 0.0125 → 0.002 g^2 /Hz • 100 to 500 Hz: 0.002 g^2/ Hz • 500 to 2000 Hz: 0.002 → 1.3 x 10-$^4g^2$/ Hz • Test time: 1 hr for each test
EMC Resistance Burst/ESD	EN 61000-6-2: 2005, EN61000-6-4/All: 2011
Installation Pos. / Protect. Class	Variable/IP20
Product certifications	CE, FCC, RoHS, Reach, UL, KC (MSIP-REM-CV3-RT-3914)
Power Dissipation	Max. 95 mA @ 5 Vdc
Isolation	I/O to Logic: Photocoupler Isolation Field Power: DC/DC Converter Isolation
Field Power	Supply Voltage: 24 Vdc nominal Voltage Range: 18 to 32 Vdc
Wiring	I/O Cable Max. 2.0 mm^2 (AWG 14)
Weight	58 g
Module size	12 mm x 99 mm x 70 mm

6.32 RT-3914 LED Indicator

Table 6-27 LED Indicator

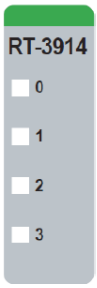
Module	LED number	LED function / description	LED colour
	0	INPUT Channel 0	Green
	1	INPUT Channel 1	
	2	INPUT Channel 2	
	3	INPUT Channel 3	

Table 6-28 Channel Status LED

Status	LED	To indicate
Normal Operation	[LED Off < 0.5 % (Maximum Input Value)] - Channel OFF [LED On > 0.5 % (Maximum Input Value)] - Channel Green	Normal Operation
Normal Operation	0 to 20 mA: LED Off > 21 mA, LED Off < 0 mA 4 to 20 mA: LED Off > 21 mA, LED Off < 3 mA -20 to 20 mA: LED Off > 21 mA, LED Off < -21 mA	Over range check
Field Power Error	All Channel Repeat the Green and OFF	Field Power is unconnected

6.33 Data Value / Current

Table 6-29 Current Range: 0 to 20 mA

Current	0.0 mA	5.0 mA	10.0 mA	20.0 mA
Data (Hex)	H0000	H03FF	H07FF	H0FFF

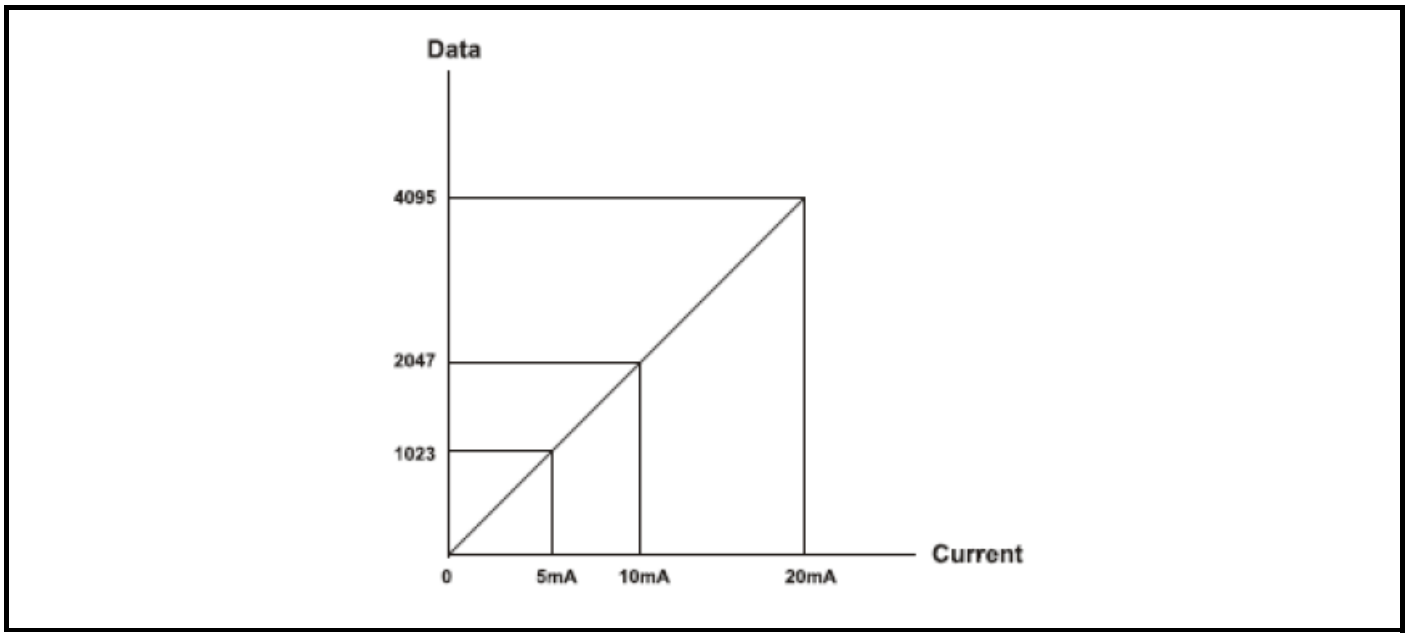


Table 6-30 Current Range: 4 to 20 mA

Current	4.0 mA	8.0 mA	12.0 mA	20.0 mA
Data (Hex)	H0000	H03FF	H07FF	H0FFF

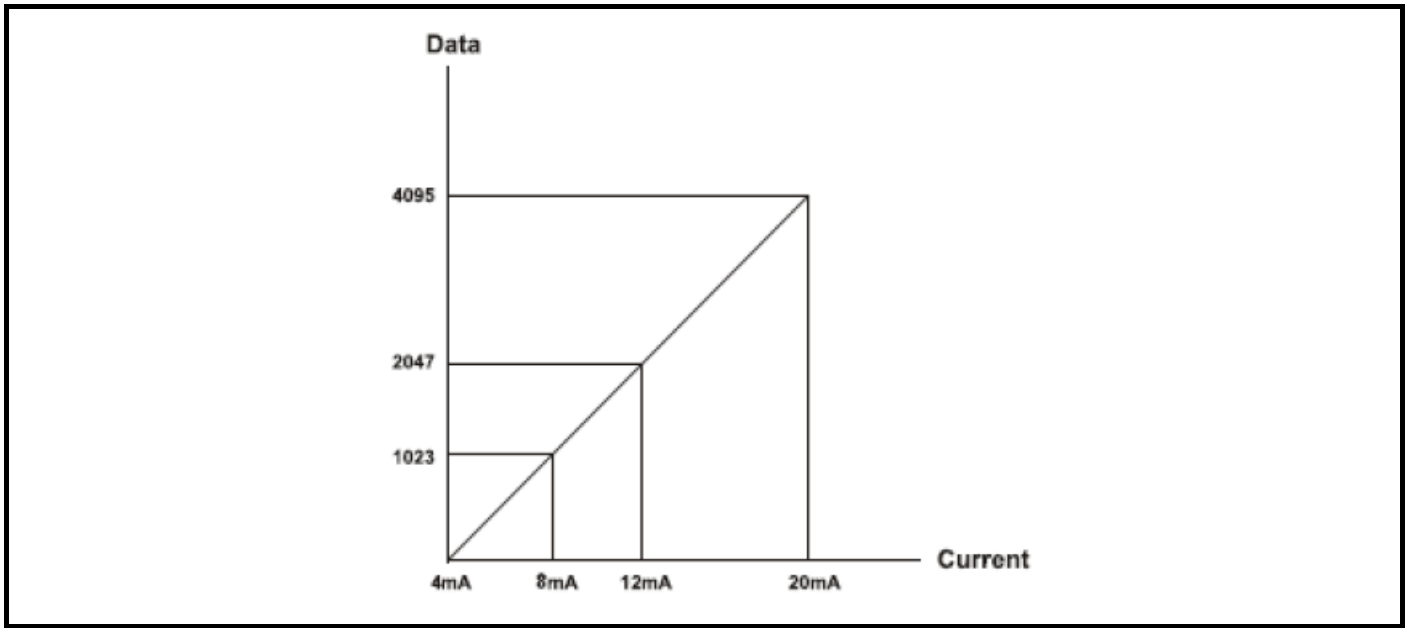
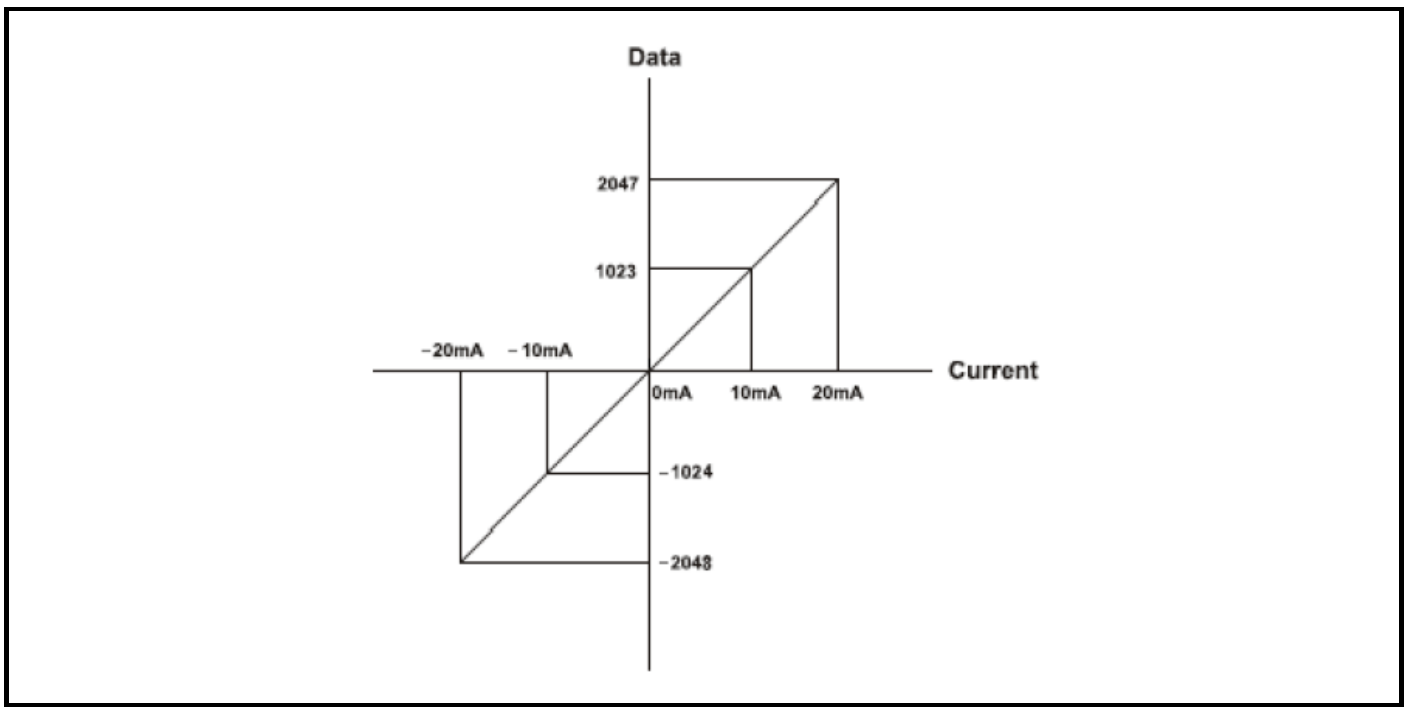


Table 6-31 Current Range: -20 to 20 mA

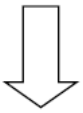
Current	-20.0 mA	-10.0 mA	0 mA	+10.0 mA	+20.0 mA
Data (Hex)	HF800	HFC00	H0000	H03FF	H07FF



6.34 Mapping data into the image table

- Input module data

Analog Input Ch0
Analog Input Ch1
Analog Input Ch2
Analog Input Ch3



- Input image value

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Analog Input Ch0 Low byte							
Byte 1	Analog Input Ch0 High byte							
Byte 2	Analog Input Ch1 Low byte							
Byte 3	Analog Input Ch1 High byte							
Byte 4	Analog Input Ch2 Low byte							
Byte 5	Analog Input Ch2 High byte							
Byte 6	Analog Input Ch3 Low byte							
Byte 7	Analog Input Ch3 High byte							

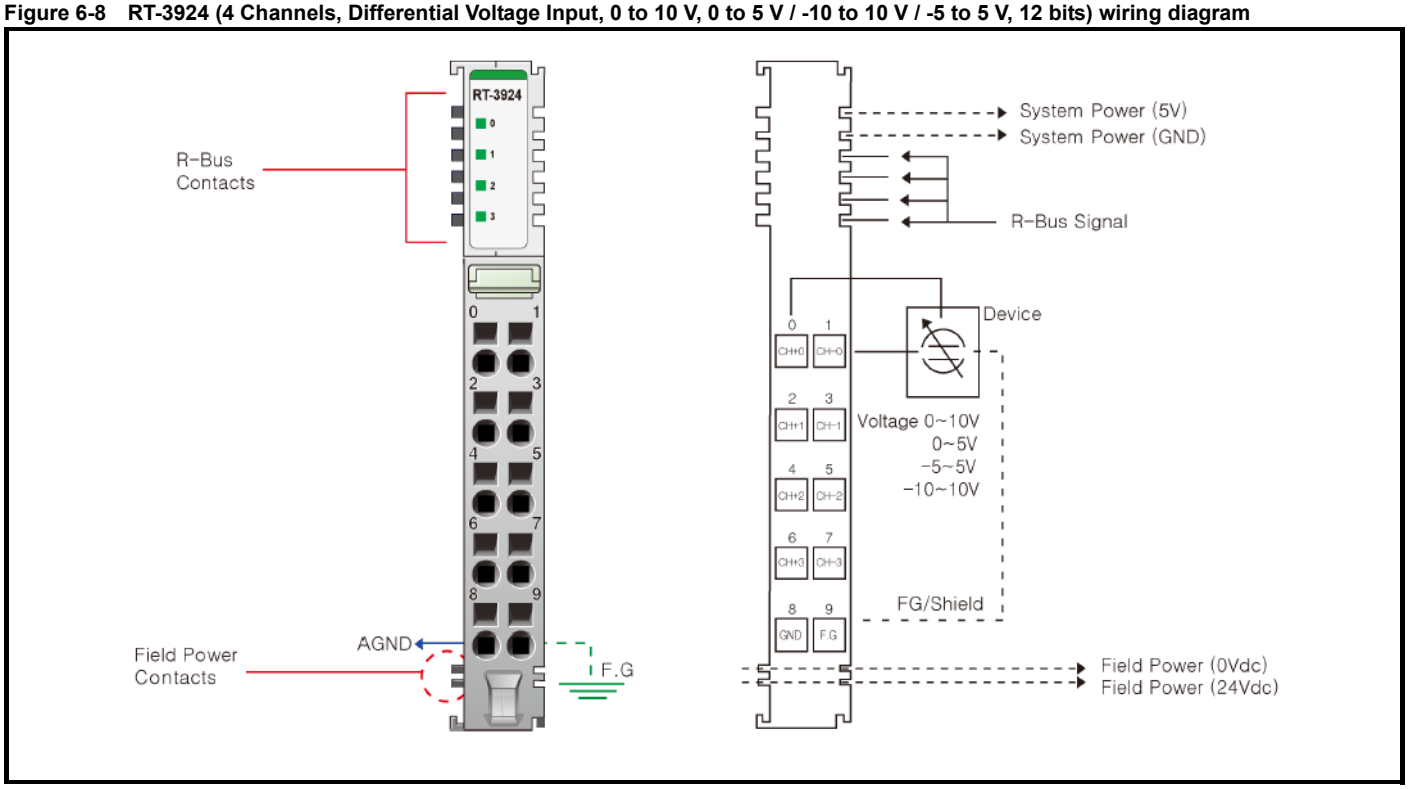
6.35 Parameter data

- Valid Parameter length: 6 Bytes
- Parameter data

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Ch#0 Command (H00: 0 to 20 mA, H01: 4 to 20 mA, H02: -20 to 20 mA)							
Byte 1	Ch#1 Command (H00: 0 to 20 mA, H01: 4 to 20 mA, H02: -20 to 20 mA)							
Byte 2	Ch#2 Command (H00: 0 to 20 mA, H01: 4 to 20 mA, H02: -20 to 20 mA)							
Byte 3	Ch#3 Command (H00: 0 to 20 mA, H01: 4 to 20 mA, H02: -20 to 20 mA)							
Byte 4	Filter Time (H00: Default Filter (=20), H01: Fastest to H62: Slowest)							
Byte 5	Reserve							

6.36 RT-3924 (4 Channels, Differential Voltage Input, 0 to 10 V, 0 to 5 V / -10 to 10 V / -5 to 5 V, 12 bits)

Figure 6-8 RT-3924 (4 Channels, Differential Voltage Input, 0 to 10 V, 0 to 5 V / -10 to 10 V / -5 to 5 V, 12 bits) wiring diagram



Pin number	Signal description	Signal description	Pin number
0	Input Channel 0 (+)	Input Channel 0 (-)	1
2	Input Channel 1 (+)	Input Channel 1 (-)	3
4	Input Channel 2 (+)	Input Channel 2 (-)	5
6	Input Channel 3 (+)	Input Channel 3 (-)	7
8	Input Channel Common (AGND)	Field Ground	9

Table 6-32 Environmental specification

Environmental specifications	
Operating temperature	-20 °C to 60 °C
Storage temperature	-40 °C to 85 °C
Relative humidity	5 % to 90 % non-condensing
Operating altitude	2000 m
Mounting	DIN rail
Input specification	
Inputs Per Module	4 Channels Differential, non-isolated between channels
Resolution in Ranges	12 bits: 2.44 mV / bit (0 to 10 V) 12 bits: 1.22 mV / bit (0 to 5 V) 12 bits: 4.88 mV / bit (-10 to 10 V) 12 bits: 2.44 mV / bit (-5 to 5 V)
Indicators	4 Green Input Status LEDs
Input Range	0 to 10 V, 0 to 5 V, -10 to 10 V, -5 to 5 V
Data Format	16 bits Integer (2' compliment)
Module Error	±0.1 % Full Scale @ 25 °C ±0.3 % Full Scale @ -20 °C, 60 °C
Input Impedance	667 kΩ
Diagnostic	Field Power Off: LED Blinking Field Power On: LED Off < 0.5 % (Maximum Input Value) Field Power On: LED On > 0.5 % (Maximum Input Value)
Conversion Time	1 msec / 4 channels
Calibration	Not Required
Common Type	4 Channels / 1 Common
General specifications	
Shock operating	IEC 60068-2-27
Vibration resistance	Sine Vibration (Based on IEC 60068-2-6) - • 5 to 25 Hz: ± 1.6 mm • 25 to 300 Hz: 4 g • Sweep Rate: 1 Oct/min, 20 Sweeps Random Vibration (Based on IEC 60068-2-64) • 10 to 40 Hz: 0.0125 g^2/ Hz • 40 to 100 Hz: 0.0125 → 0.002 g^2 /Hz • 100 to 500 Hz: 0.002 g^2/ Hz • 500 to 2000 Hz: 0.002 → 1.3 x $10^{-4}g^2$/ Hz • Test time: 1 hr for each test
EMC Resistance Burst/ESD	EN 61000-6-2: 2005, EN61000-6-4/All: 2011
Installation Pos. / Protect. Class	Variable/IP20
Product certifications	CE, FCC, RoHS, Reach, UL, KC (MSIP-REM-CV3-RT-3924)
Power Dissipation	Max. 100 mA @ 5 Vdc
Isolation	I/O to Logic: Photocoupler Isolation Field Power: Non-Isolation
Field Power	Supply Voltage: 24 Vdc nominal Voltage Range: 18 to 32 Vdc
Wiring	I/O Cable Max. 2.0 mm^2 (AWG 14)
Weight	58 g
Module size	12 mm x 99 mm x 70 mm

6.37 RT-3924 LED Indicator

Table 6-33 LED Indicator

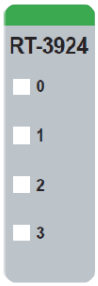
Module	LED number	LED function / description	LED colour
	0	INPUT Channel 0	Green
	1	INPUT Channel 1	
	2	INPUT Channel 2	
	3	INPUT Channel 3	

Table 6-34 Channel Status LED

Status	LED	To indicate
Normal Operation	[LED Off < 0.5 % (Maximum Input Value)] - Channel OFF [LED On > 0.5 % (Maximum Input Value)] - Channel Green	Normal Operation
Field Power Error	All Channel Repeat the Green and OFF	Field Power is unconnected

6.38 Data Value / Voltage

Table 6-35 Voltage Range: 0 to 10 V

Current	0.0 V	2.5 V	5.0 V	10.0 V
Data (Hex)	H0000	H03FF	H07FF	H0FFF

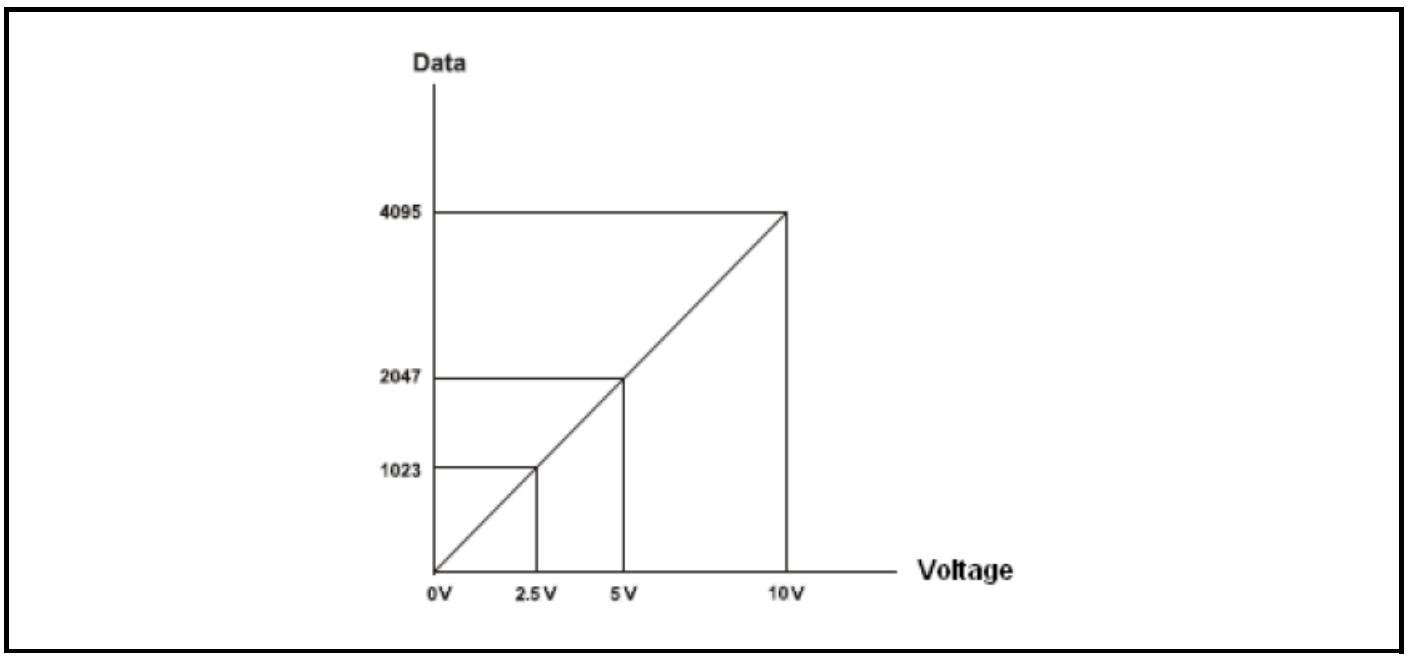


Table 6-36 Voltage Range: 0 to 5 V

Voltage	0.0 V	1.25 V	2.5 V	5.0 V
Data (Hex)	H0000	H03FF	H07FF	H0FFF

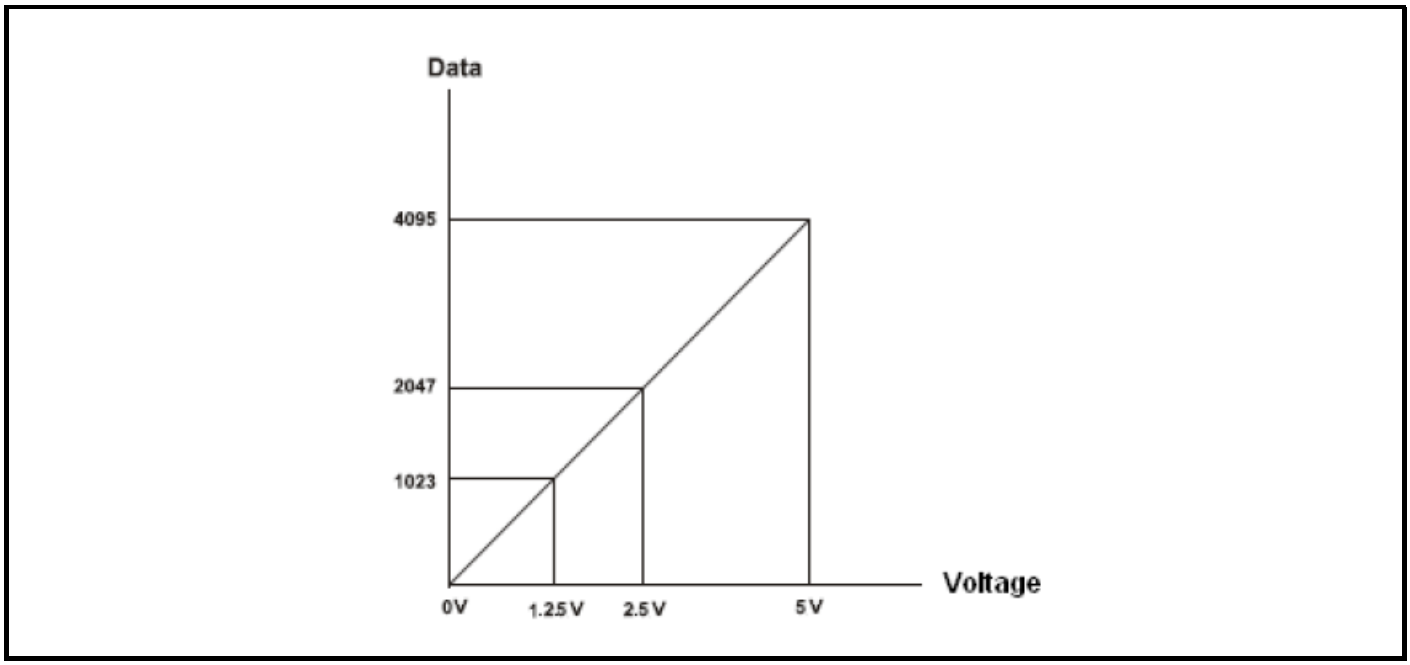
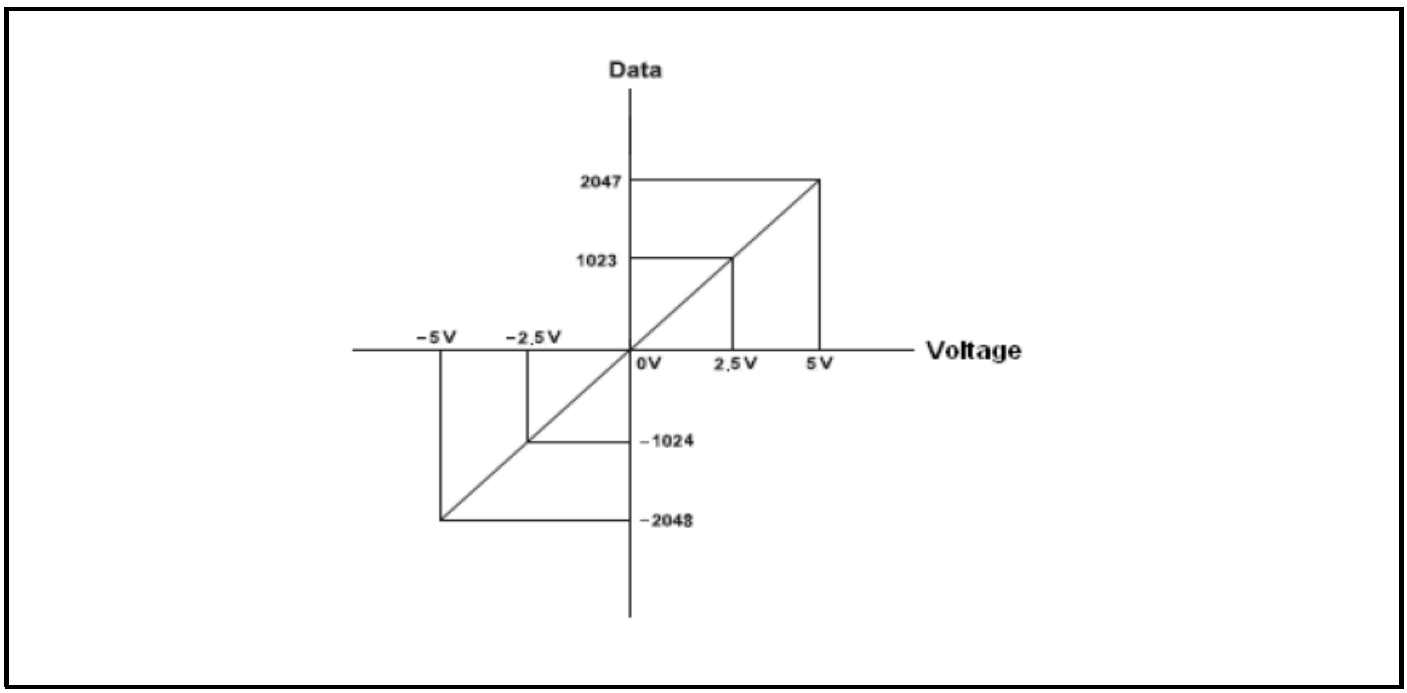


Table 6-37 Voltage Range: -5 to 5 V;

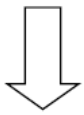
Voltage	-5.0 V	-2.5 V	0 V	2.5 V	5.0 V
Data (Hex)	HF800	HFC00	H0000	H03FF	H07FF



6.39 Mapping data into the image table

- Input module data

Analog Input Ch0
Analog Input Ch1
Analog Input Ch2
Analog Input Ch3



- Input image value

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Analog Input Ch0 Low byte							
Byte 1	Analog Input Ch0 High byte							
Byte 2	Analog Input Ch1 Low byte							
Byte 3	Analog Input Ch1 High byte							
Byte 4	Analog Input Ch2 Low byte							
Byte 5	Analog Input Ch2 High byte							
Byte 6	Analog Input Ch3 Low byte							
Byte 7	Analog Input Ch3 High byte							

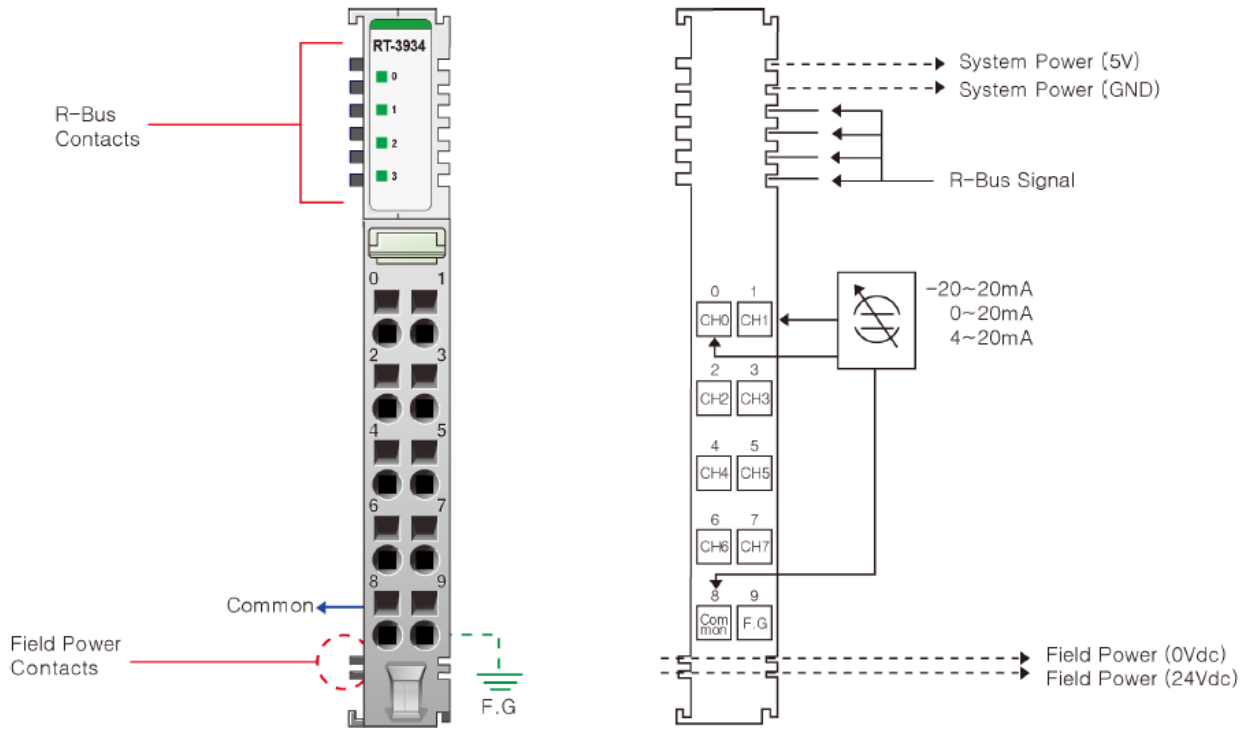
6.40 Parameter data

- Valid Parameter length: 6 Bytes
- Parameter data

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Ch#0 Command (H00: 0 to10 V, H01: 0 to 5 V, H02: -10 to 10 V, H03: -5 to 5 V)							
Byte 1	Ch#1 Command (H00: 0 to10 V, H01: 0 to 5 V, H02: -10 to 10 V, H03: -5 to 5 V)							
Byte 2	Ch#2 Command (H00: 0 to10 V, H01: 0 to 5 V, H02: -10 to 10 V, H03: -5 to 5 V)							
Byte 3	Ch#3 Command (H00: 0 to10 V, H01: 0 to 5 V, H02: -10 to 10 V, H03: -5 to 5 V)							
Byte 4	Filter Time (H00: Default Filter (=20), H01: Fastest to H62: Slowest)							
Byte 5	Reserve							

6.41 RT-3934 (4 Channels, Differential Current Input, 0 to 20 mA / 4 to 20 mA / -20 to 20 mA, 15 bits)

Figure 6-9 RT-3934 (4 Channels, Differential Current Input, 0 to 20 mA / 4 to 20 mA / -20 to 20 mA, 15 bits) wiring diagram



Pin number	Signal description	Signal description	Pin number
0	Input Channel 0 (+)	Input Channel 0 (-)	1
2	Input Channel 1 (+)	Input Channel 1 (-)	3
4	Input Channel 2 (+)	Input Channel 2 (-)	5
6	Input Channel 3 (+)	Input Channel 3 (-)	7
8	Input Channel Common (AGND)	Field Ground	9

Table 6-38 Environmental specification

Environmental specifications	
Operating temperature	-20 °C to 60 °C
Storage temperature	-40 °C to 85 °C
Relative humidity	5 % to 90 % non-condensing
Operating altitude	2000 m
Mounting	DIN rail
Input specification	
Inputs Per Module	4 Channels Differential, non-isolated between channels
Resolution in Ranges	15 bits: 0.61 uA / bit (0 to 20 mA) 15 bits: 0.49 uA / bit (4 to 20 mA) 15 bits: 1.22 uA / bit (-20 to 20 mA)
Indicators	4 Green Input Status LEDs
Input Range	0 to 20 mA, 4 to 20 mA, -20 to 20 mA
Data Format	16 bits Integer (2' compliment)
Module Error	±0.1 % Full Scale @ 25 °C ±0.3 % Full Scale @ -20 °C, 60 °C
Input Impedance	121.5 Ω
Diagnostic	Field Power Off: LED Blinking Field Power On: LED Off < 0.5 % (Maximum Input Value) Field Power On: LED On > 0.5 % (Maximum Input Value)
Conversion Time	1 msec / 4 channels
Calibration	Not Required
Common Type	4 Channels / 1 Common
General specifications	
Shock operating	IEC 60068-2-27
Vibration resistance	Sine Vibration (Based on IEC 60068-2-6) - • 5 to 25 Hz: ± 1.6 mm • 25 to 300 Hz: 4 g • Sweep Rate: 1 Oct/min, 20 Sweeps Random Vibration (Based on IEC 60068-2-64) • 10 to 40 Hz: 0.0125 g^2/ Hz • 40 to 100 Hz: 0.0125 → 0.002 g^2 /Hz • 100 to 500 Hz: 0.002 g^2/ Hz • 500 to 2000 Hz: 0.002 → 1.3 x 10-$^4g^2$/ Hz • Test time: 1 hr for each test
EMC Resistance Burst/ESD	EN 61000-6-2: 2005 EN61000-6-4/All: 2011
Installation Pos. / Protect. Class	Variable/IP20
Product certifications	CE, FCC, RoHS, Reach, UL, KC (MSIP-REM-CV3-RT-3934)
Power Dissipation	Max. 100 mA @ 5 Vdc
Isolation	I/O to Logic: Photocoupler Isolation Field Power: DC/DC Converter Isolation
Field Power	Supply Voltage: 24 Vdc nominal Voltage Range: 18 to 32 Vdc
Wiring	I/O Cable Max. 2.0 mm^2 (AWG 14)
Weight	58 g
Module size	12 mm x 99 mm x 70 mm

6.42 RT-3934 LED Indicator

Table 6-39 LED Indicator

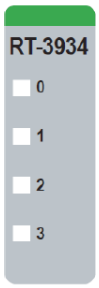
Module	LED number	LED function / description	LED colour
	0	INPUT Channel 0	Green
	1	INPUT Channel 1	
	2	INPUT Channel 2	
	3	INPUT Channel 3	

Table 6-40 Channel Status LED

Status	LED	To indicate
Normal Operation	[LED Off < 0.5 % (Maximum Input Value)] - Channel OFF [LED On > 0.5 % (Maximum Input Value)] - Channel Green	Normal Operation
Normal Operation	0 to 20 mA: LED Off < 0 mA 4 to 20 mA: LED Off < 3mA -20 to 20 mA: LED Off > 21 mA, LED Off < -21 mA	Over range check
Field Power Error	All Channel Repeat the Green and OFF	Field Power is unconnected

6.43 Data Value / Current

Table 6-41 Current Range: 0 to 20 mA

Current	0.0 mA	5.0 mA	10.0 mA	20.0 mA
Data (Hex)	H0000	H1FFF	H3FFF	H7FFF

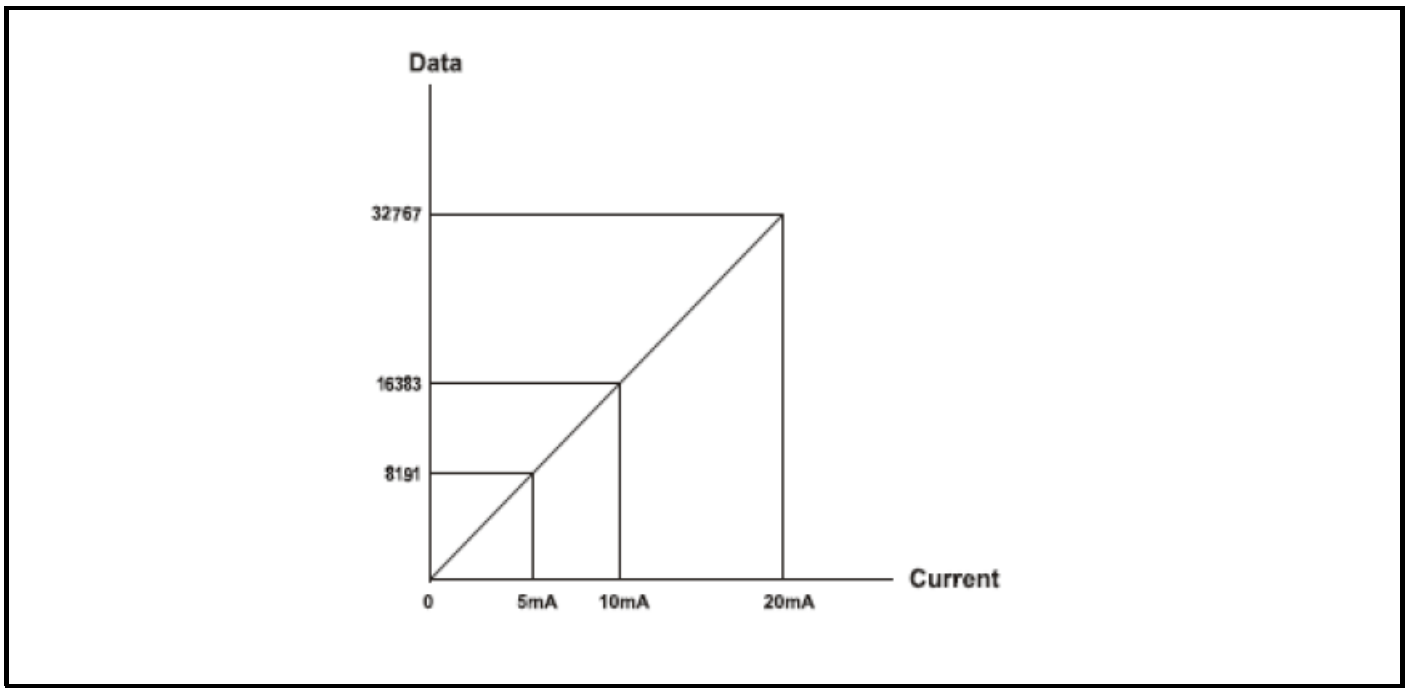


Table 6-42 Current Range: 4 to 20 mA

Current	4.0 mA	8.0 mA	12.0 mA	20.0 mA
Data (Hex)	H0000	H1FFF	H3FFF	H7FFF

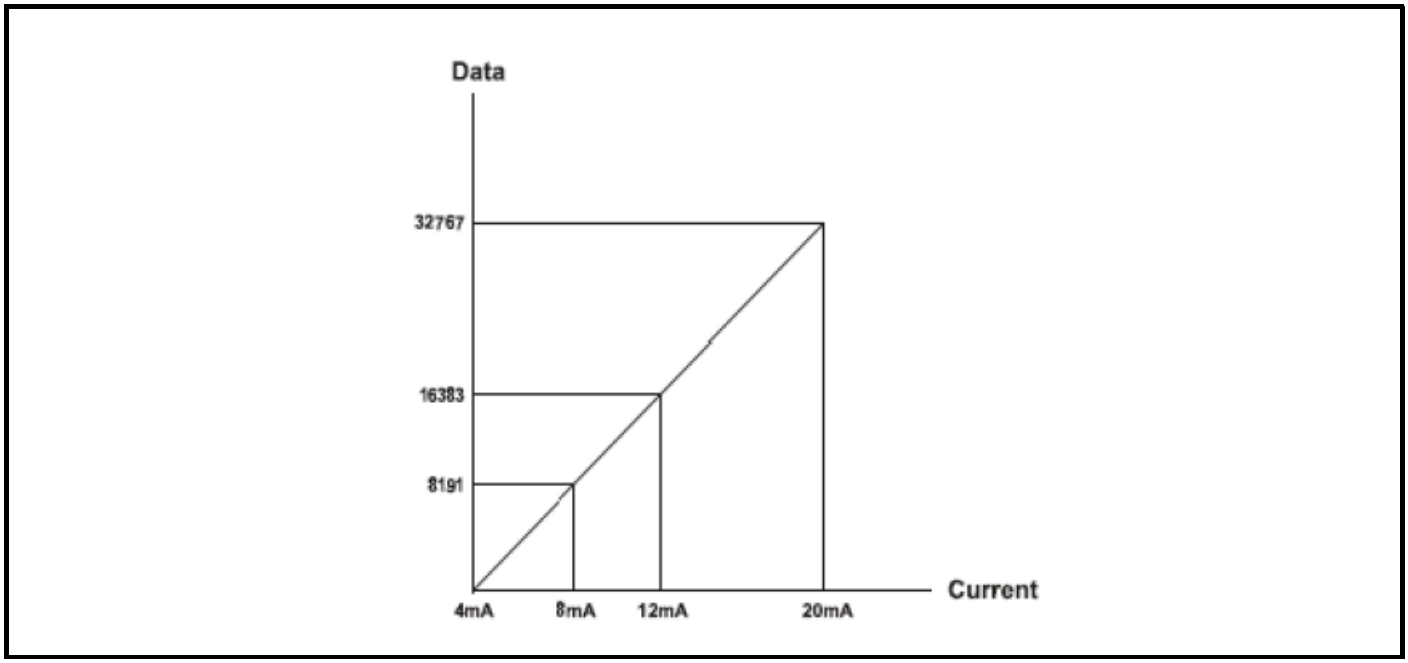
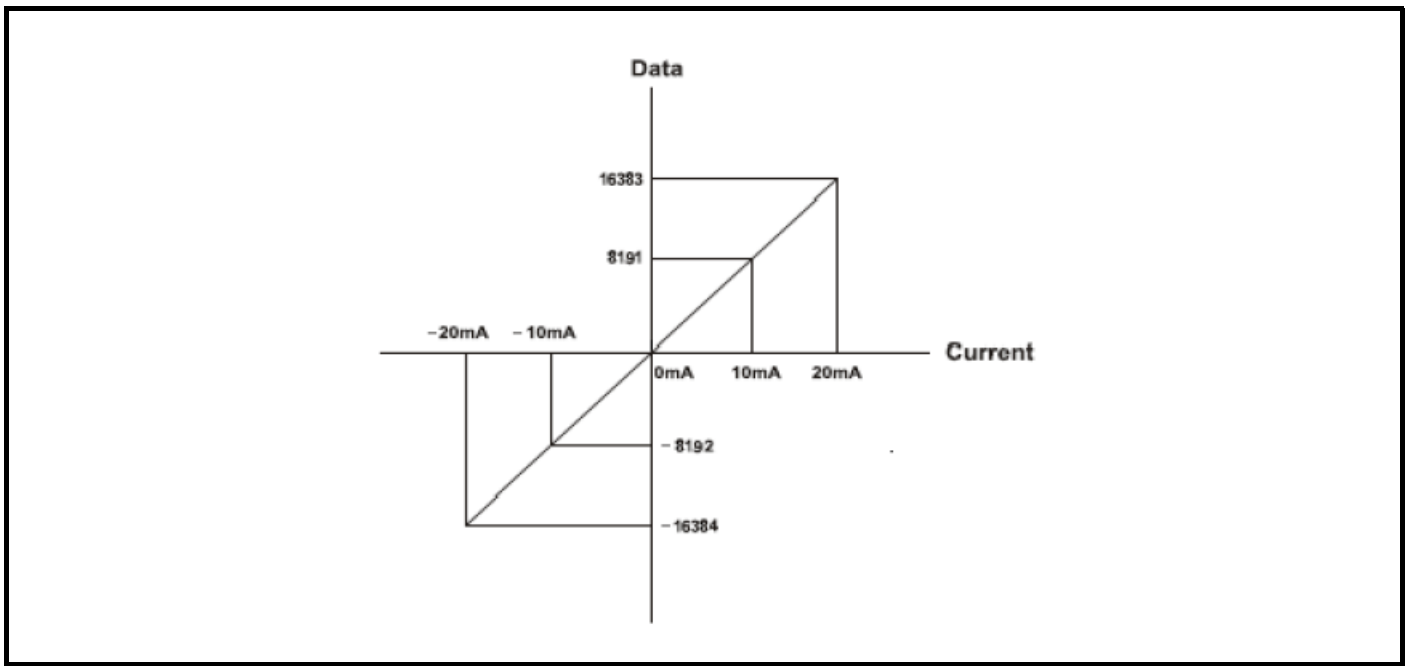


Table 6-43 Current Range: -20 to 20 mA

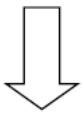
Current	-20.0 mA	-10.0 mA	0 mA	+10.0 mA	+20.0 mA
Data (Hex)	HC000	HE000	H0000	H1FFF	H3FFF



6.44 Mapping data into the image table

- Input module data

Analog Input Ch0
Analog Input Ch1
Analog Input Ch2
Analog Input Ch3



- Input image value

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Analog Input Ch0 Low byte							
Byte 1	Analog Input Ch0 High byte							
Byte 2	Analog Input Ch1 Low byte							
Byte 3	Analog Input Ch1 High byte							
Byte 4	Analog Input Ch2 Low byte							
Byte 5	Analog Input Ch2 High byte							
Byte 6	Analog Input Ch3 Low byte							
Byte 7	Analog Input Ch3 High byte							

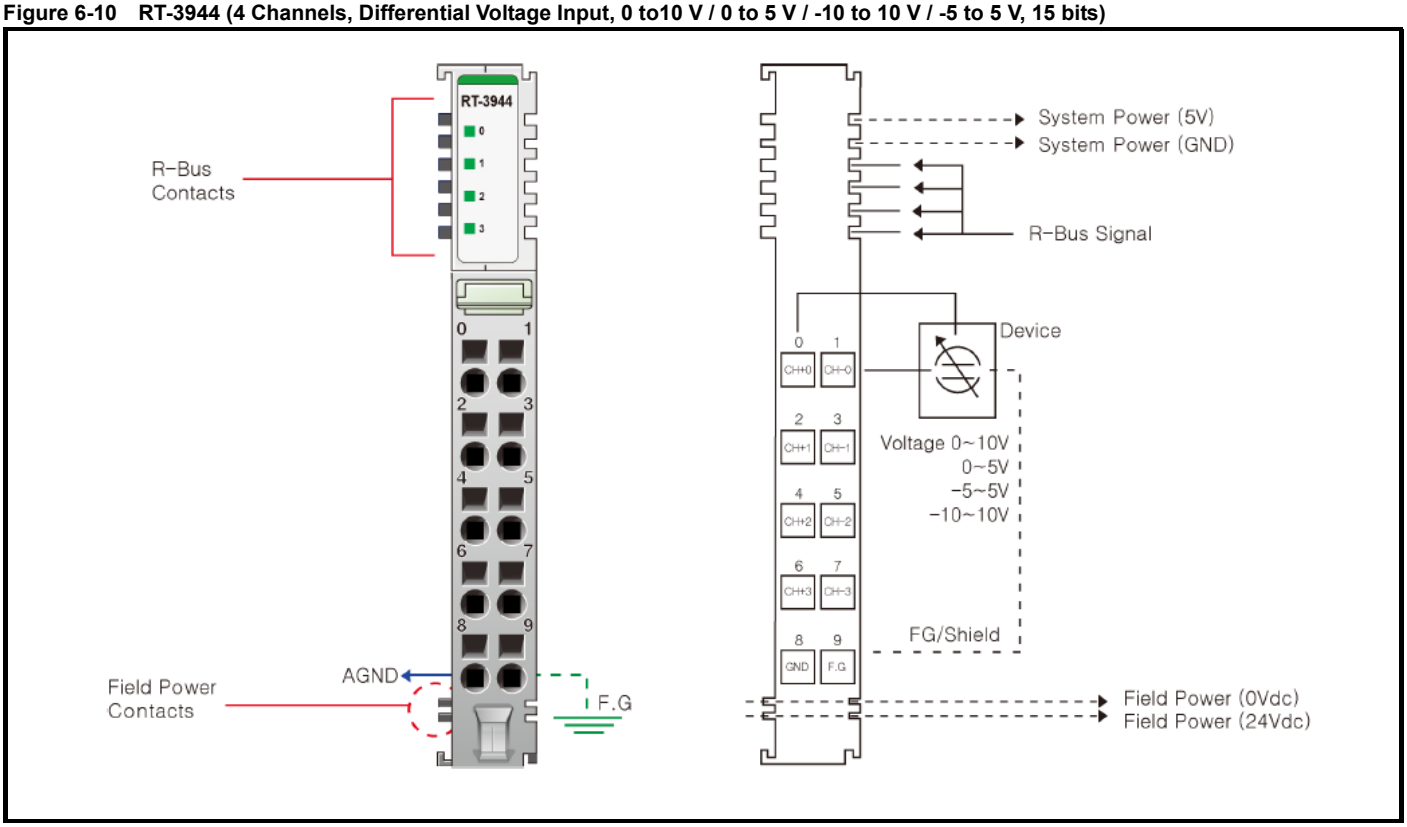
6.45 Parameter data

- Valid Parameter length: 6 Bytes
- Parameter data

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Ch#0 Command (H00: 0 to 20 mA, H01: 4 to 20 mA, H02: -20 to 20 mA)							
Byte 1	Ch#1 Command (H00: 0 to 20 mA, H01: 4 to 20 mA, H02: -20 to 20 mA)							
Byte 2	Ch#2 Command (H00: 0 to 20 mA, H01: 4 to 20 mA, H02: -20 to 20 mA)							
Byte 3	Ch#3 Command (H00: 0 to 20 mA, H01: 4 to 20 mA, H02: -20 to 20 mA)							
Byte 4	Filter Time (H00: Default Filter (=20), H01: Fastest to H62: Slowest)							
Byte 5	Reserve							

6.46 RT-3944 (4 Channels, Differential Voltage Input, 0 to 10 V / 0 to 5 V / -10 to10 V / -5 to 5 V, 15 bits)

Figure 6-10 RT-3944 (4 Channels, Differential Voltage Input, 0 to10 V / 0 to 5 V / -10 to 10 V / -5 to 5 V, 15 bits)



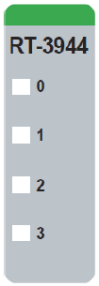
Pin number	Signal description	Signal description	Pin number
0	Input Channel 0 (+)	Input Channel 0 (-)	1
2	Input Channel 1 (+)	Input Channel 1 (-)	3
4	Input Channel 2 (+)	Input Channel 2 (-)	5
6	Input Channel 3 (+)	Input Channel 3 (-)	7
8	Input Channel Common (AGND)	Field Ground	9

Table 6-44 Environmental specification

Environmental specifications	
Operating temperature	-20 °C to 60 °C
Storage temperature	-40 °C to 85 °C
Relative humidity	5 % to 90 % non-condensing
Operating altitude	2000 m
Mounting	DIN rail
Input specification	
Inputs Per Module	4 Channels Differential, non-isolated between channels
Resolution in Ranges	15 bits: 0.31 mV /Bit (0 to 10 V) 15 bits: 0.15 mV /Bit (0 to 5 V) 15 bits: 0.61 mV /Bit (-10 to 10 V) 15 bits: 0.31 mV /Bit (-5 to 5 V)
Indicators	4 Green Input Status LEDs
Input Range	0 to 10 V, 0 to 5 V, -10 to 10 V, -5 to 5 V
Data Format	16 bits Integer (2' compliment)
Module Error	±0.1 % Full Scale @ 25 °C ±0.3 % Full Scale @ -20 °C, 60 °C
Input Impedance	667 kΩ
Diagnostic	Field Power Off: LED Blinking Field Power On: LED Off < 0.5 % (Maximum Input Value) Field Power On: LED On > 0.5 % (Maximum Input Value)
Conversion Time	1 msec / 4 channels
Calibration	Not Required
Common Type	4 Channels / 1 Common
General specifications	
Shock operating	IEC 60068-2-27
Vibration resistance	Sine Vibration (Based on IEC 60068-2-6) - • 5 to 25 Hz: ± 1.6 mm • 25 to 300 Hz: 4 g • Sweep Rate: 1 Oct/min, 20 Sweeps Random Vibration (Based on IEC 60068-2-64) • 10 to 40 Hz: 0.0125 g^2/ Hz • 40 to 100 Hz: 0.0125 → 0.002 g^2 /Hz • 100 to 500 Hz: 0.002 g^2/ Hz • 500 to 2000 Hz: 0.002 → 1.3 x $10^{-4}g^2$/ Hz • Test time: 1 hr for each test
EMC Resistance Burst/ESD	EN 61000-6-2: 2005 EN61000-6-4/All: 2011
Installation Pos. / Protect. Class	Variable/IP20
Product certifications	CE, FCC, RoHS, Reach, UL, KC (MSIP-REM-CV3-RT-3944)
Power Dissipation	Max. 100 mA @ 5 Vdc
Isolation	I/O to Logic: Photocoupler Isolation Field Power: Non-Isolation
Field Power	Supply Voltage: 24 Vdc nominal Voltage Range: 18 to 32 Vdc
Wiring	I/O Cable Max. 2.0 mm^2 (AWG 14)
Weight	58 g
Module size	12 mm x 99 mm x 70 mm

6.47 RT-3944 LED Indicator

Table 6-45 LED Indicator

Module	LED number	LED function / description	LED colour
	0	INPUT Channel 0	Green
	1	INPUT Channel 1	
	2	INPUT Channel 2	
	3	INPUT Channel 3	

6.47.1 Channel Status LED

Status	LED	To indicate
Normal Operation	[LED Off < 0.5 % (Maximum Input Value)] - Channel OFF [LED On > 0.5 % (Maximum Input Value)] - Channel Green	Normal Operation
Field Power Error	All Channel Repeat the Green and OFF	Field Power is unconnected

6.48 Data Value / Voltage

Table 6-46 Voltage Range: 0 to 10 V

Current	0.0 V	2.5 V	5.0 V	10.0 V
Data (Hex)	H0000	H1FFF	H3FFF	H7FFF

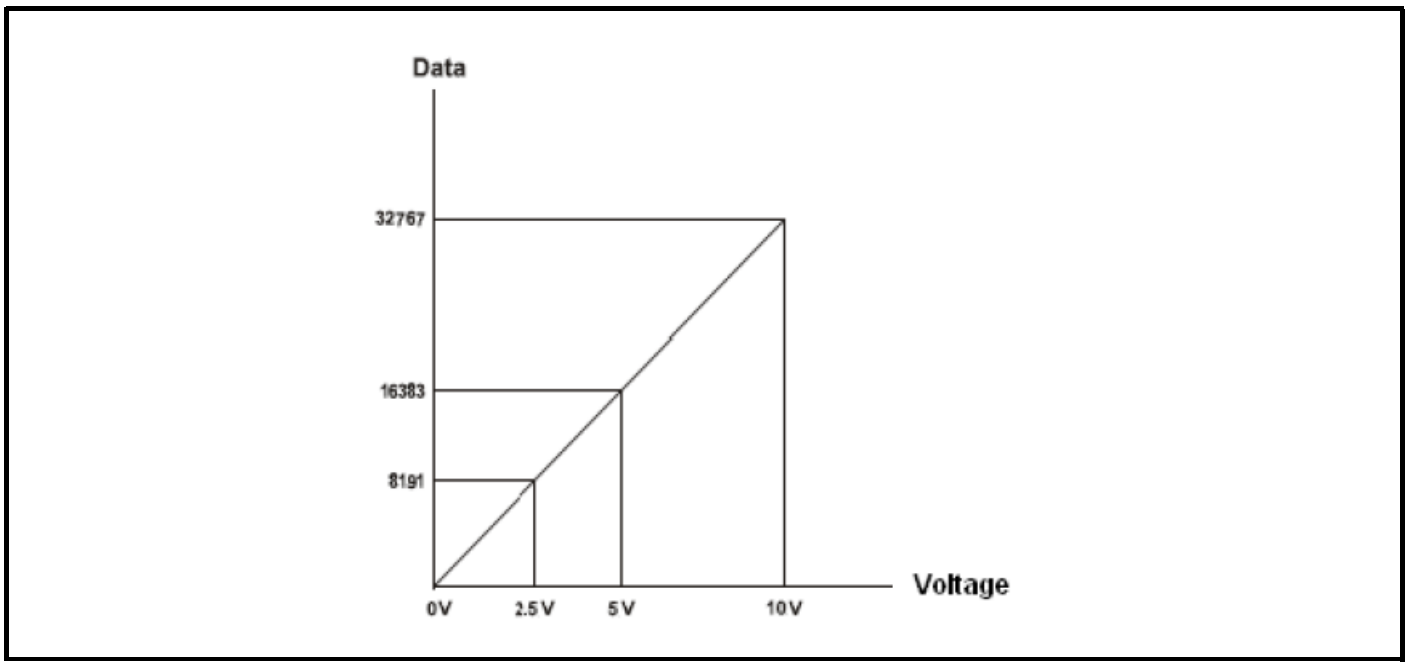


Table 6-47 Voltage Range: 0 to 5 V

Voltage	0.0 V	1.25 V	2.5 V	5.0 V
Data (Hex)	H0000	H1FFF	H3FFF	H7FFF

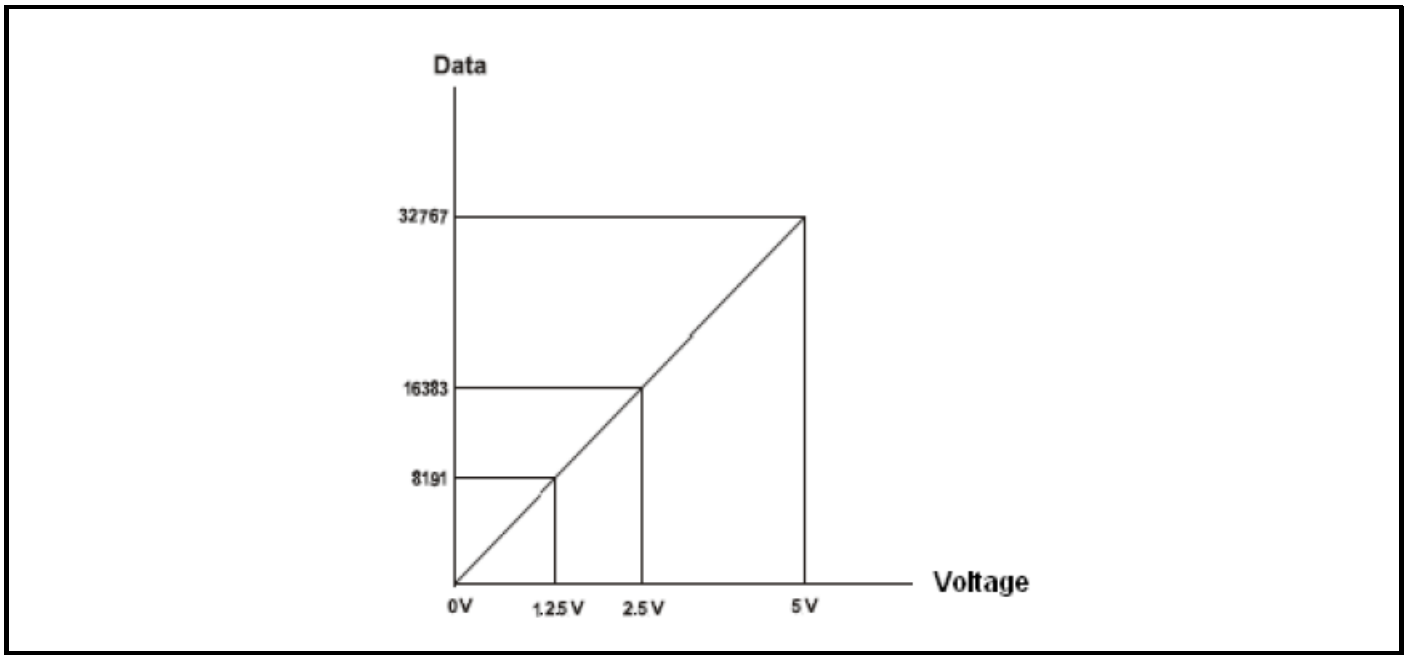


Table 6-48 Voltage Range: -10 to 10 V

Voltage	-10.0 V	-5.0 V	0 V	5.0 V	10.0 V
Data (Hex)	HC000	HE000	H0000	H1FFF	H3FFF

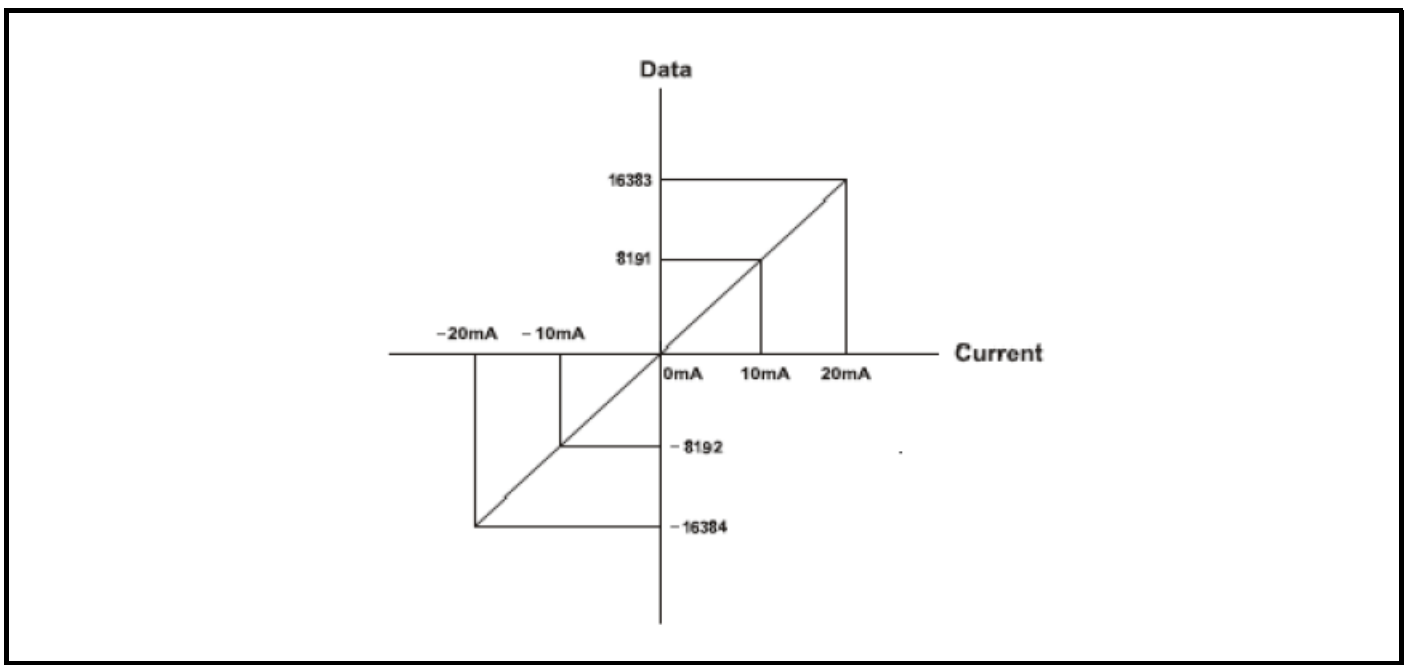
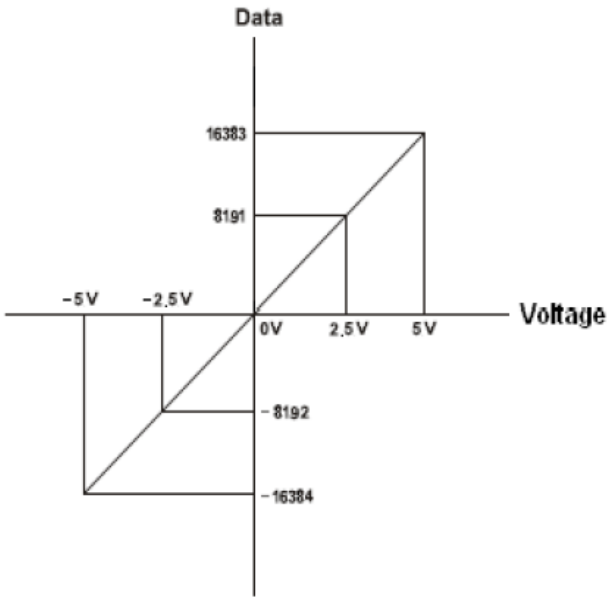


Table 6-49 Voltage Range: -5 to 5 V

Voltage	-5.0 V	-2.5 V	0 V	2.5 V	5.0 V
Data (Hex)	HF800	HE000	H0000	H1FFF	H3FFF



6.49 Mapping data into the image table

- Input module data

Analog Input Ch0
Analog Input Ch1
Analog Input Ch2
Analog Input Ch3

- Input image value

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Analog Input Ch0 Low byte							
Byte 1	Analog Input Ch0 High byte							
Byte 2	Analog Input Ch1 Low byte							
Byte 3	Analog Input Ch1 High byte							
Byte 4	Analog Input Ch2 Low byte							
Byte 5	Analog Input Ch2 High byte							
Byte 6	Analog Input Ch3 Low byte							
Byte 7	Analog Input Ch3 High byte							

6.50 Parameter data

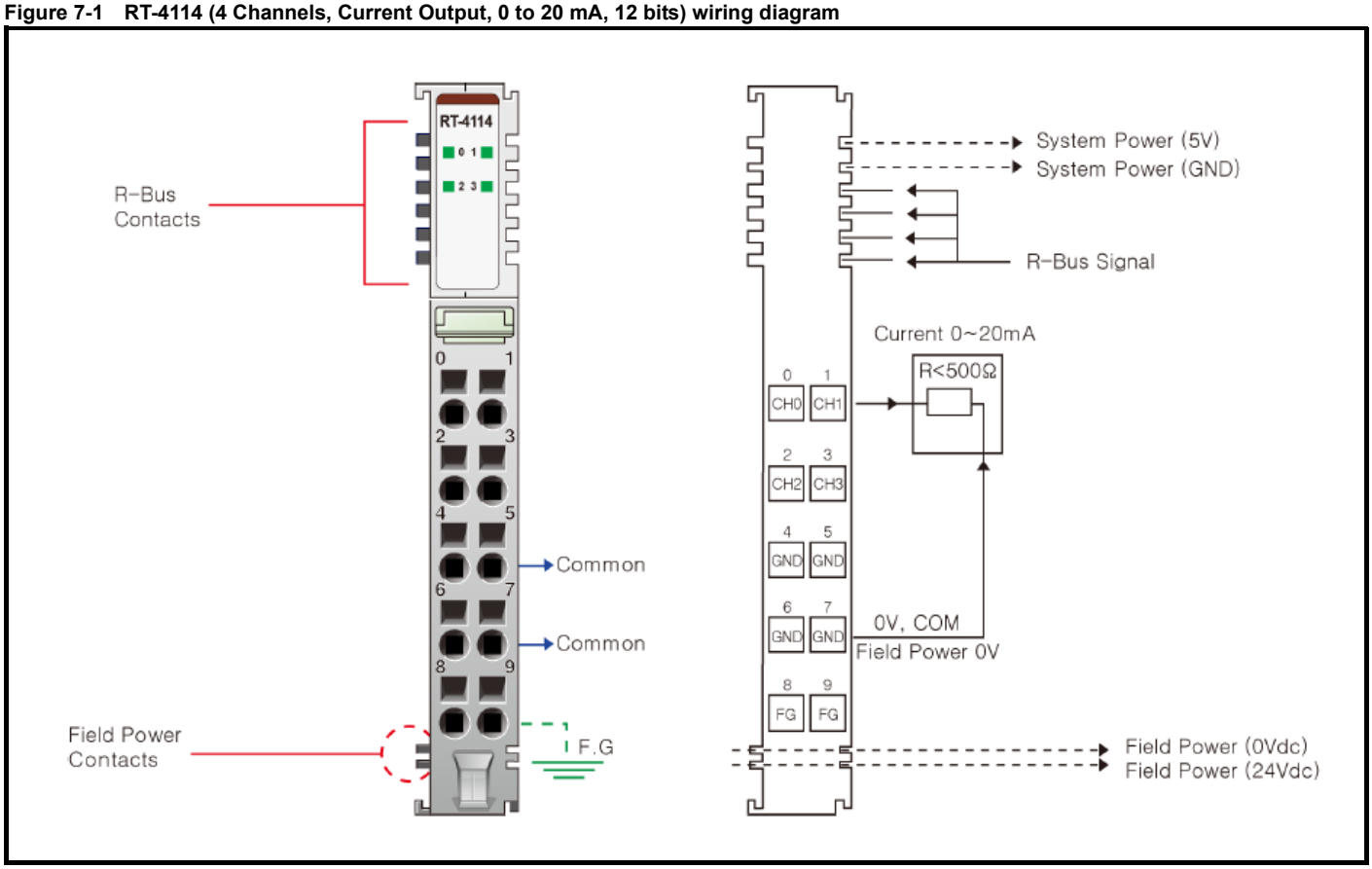
- Valid Parameter length: 6 Bytes
- Parameter data

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Ch#0 Command (H00: 0 to10 V, H01: 0 to 5 V, H02: -10 to 10 V, H03: -5 to 5 V)							
Byte 1	Ch#1 Command (H00: 0 to10 V, H01: 0 to 5 V, H02: -10 to 10 V, H03: -5 to 5 V)							
Byte 2	Ch#2 Command (H00: 0 to10 V, H01: 0 to 5 V, H02: -10 to 10 V, H03: -5 to 5 V)							
Byte 3	Ch#3 Command (H00: 0 to10 V, H01: 0 to 5 V, H02: -10 to 10 V, H03: -5 to 5 V)							
Byte 4	Filter Time (H00: Default Filter (=20), H01: Fastest to H62: Slowest)							
Byte 5	Reserve							

7 Analog Output

7.1 RT-4114 (4 Channels, Current Output, 0 to 20 mA, 12 bits)

Figure 7-1 RT-4114 (4 Channels, Current Output, 0 to 20 mA, 12 bits) wiring diagram



Pin number	Signal description	Signal description	Pin number
0	Analog Output Channel 0	Analog Output Channel 1	1
2	Analog Output Channel 2	Analog Output Channel 3	3
4	Output Channel Common (AGND)	Output Channel Common (AGND)	5
6	Output Channel Common (AGND)	Output Channel Common (AGND)	7
8	Field Ground	Field Ground	9

Table 7-1 Environmental specification

Environmental specifications	
Operating temperature	-20 °C to 60 °C
Storage temperature	-40 °C to 85 °C
Relative humidity	5 % to 90 % non-condensing
Operating altitude	2000 m
Mounting	DIN rail
Output specification	
Outputs Per Module	4 Channels Single Ended
Indicators	4 Green Output Status LEDs
Resolution in Ranges	12 bits: 4.88 uA / bit
Output Current Range	0 to 20 mA
Data Format	16 bits Integer (2's complement)
Module Error	±0.1 % Full Scale @ 25 °C ±0.3 % Full Scale @ -20 °C, 60 °C
Load Resistance	Max. 500 Ω
Diagnostic	Field Power Off: LED Blinking Field Power On: No Output LED Off Field Power On: Output LED ON
Conversion Time	≤0.25 ms / channel
Calibration	Not Required
Common Type	4 Channels / 4 Common
General specifications	
Shock operating	IEC 60068-2-27
Vibration resistance	Sine Vibration (Based on IEC 60068-2-6) - • 5 to 25 Hz: ± 1.6 mm • 25 to 300 Hz: 4 g • Sweep Rate: 1 Oct/min, 20 Sweeps Random Vibration (Based on IEC 60068-2-64) • 10 to 40 Hz: 0.0125 g^2/ Hz • 40 to 100 Hz: 0.0125 → 0.002 g^2 /Hz • 100 to 500 Hz: 0.002 g^2/ Hz • 500 to 2000 Hz: 0.002 → 1.3 x 10-$^4g^2$/ Hz • Test time: 1 hr for each test
EMC resistance burst/ESD	EN 61000-6-2: 2005 EN 61000-6-4/A11: 2011
Installation Pos. / Protect. Class	Variable/IP20
Product certifications	CE, FCC, RoHS, Reach, UL, KC(MSIP-REM-CV3-RT-4114)
Power Dissipation	Max. 100 mA @ 5 Vdc
Field Power	Supply Voltage: 24 Vdc nominal Voltage Range: 18 to 32 Vdc
Wiring	I/O Cable Max. 2.0 mm^2 (AWG 14)
Weight	58 g
Module size	12 mm x 99 mm x 70 mm

7.2 RT-4114 LED Indicator

Table 7-2 LED Indicator

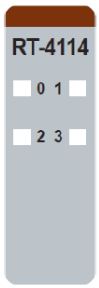
Module	LED number	LED function / description	LED colour
	0	OUTPUT Channel 0	Green
	1	OUTPUT Channel 1	
	2	OUTPUT Channel 2	
	3	OUTPUT Channel 3	

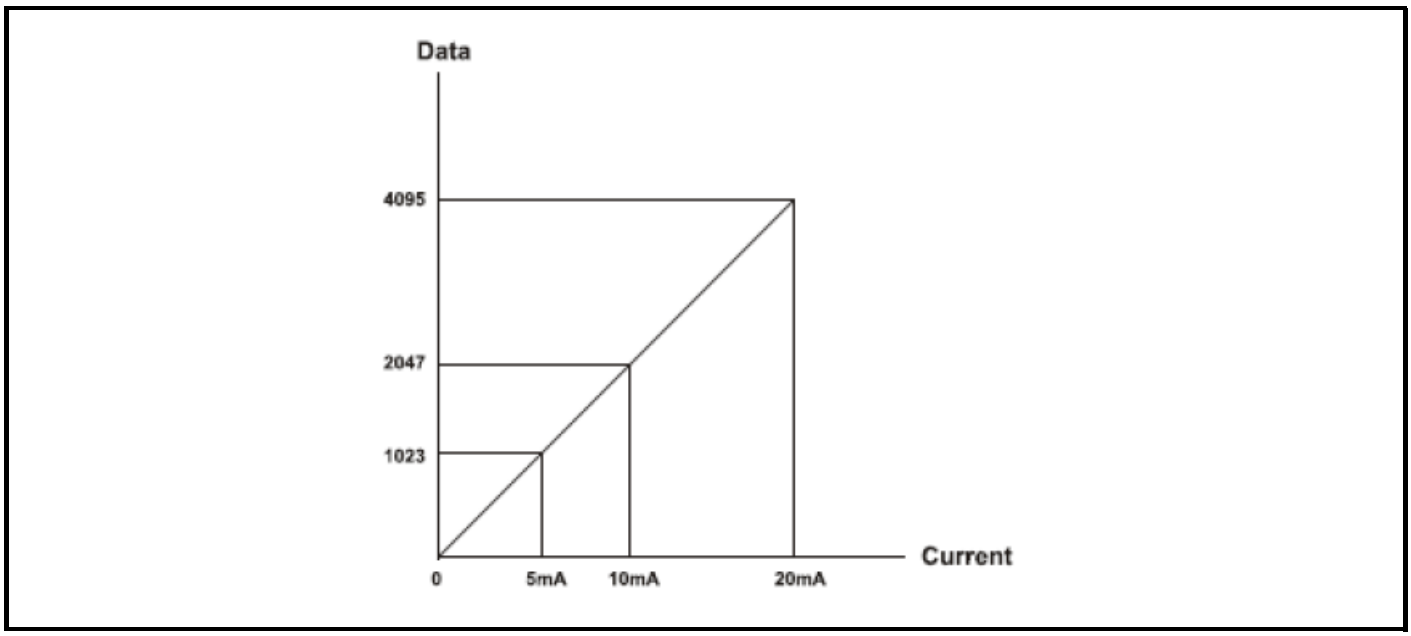
Table 7-3 Channel Status LED

Status	LED	To indicate
Normal Operation	Off	No Output Value
	Green	Normal Operation
Field Power Error	All Channel Repeat the Green and Off	Field power is unconnected

7.3 Data Value / Current

Table 7-4 Current Range: 0 to 20 mA

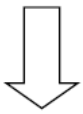
Current	0.0 mA	5.0 mA	10.0 mA	20.0 mA
Data (Hex)	H0000	H03FF	H07FF	H0FFF



7.4 Mapping data from the image table

- Output Image Value

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Analog Output Ch0 Low byte							
Byte 1	Analog Output Ch0 High byte							
Byte 2	Analog Output Ch1 Low byte							
Byte 3	Analog Output Ch1 High byte							
Byte 4	Analog Output Ch2 Low byte							
Byte 5	Analog Output Ch2 High byte							
Byte 6	Analog Output Ch3 Low byte							
Byte 7	Analog Output Ch3 High byte							



- Output Module Data -8 byte Output Data

Analog Output Ch0
Analog Output Ch1
Analog Output Ch2
Analog Output Ch3

7.5 Parameter data

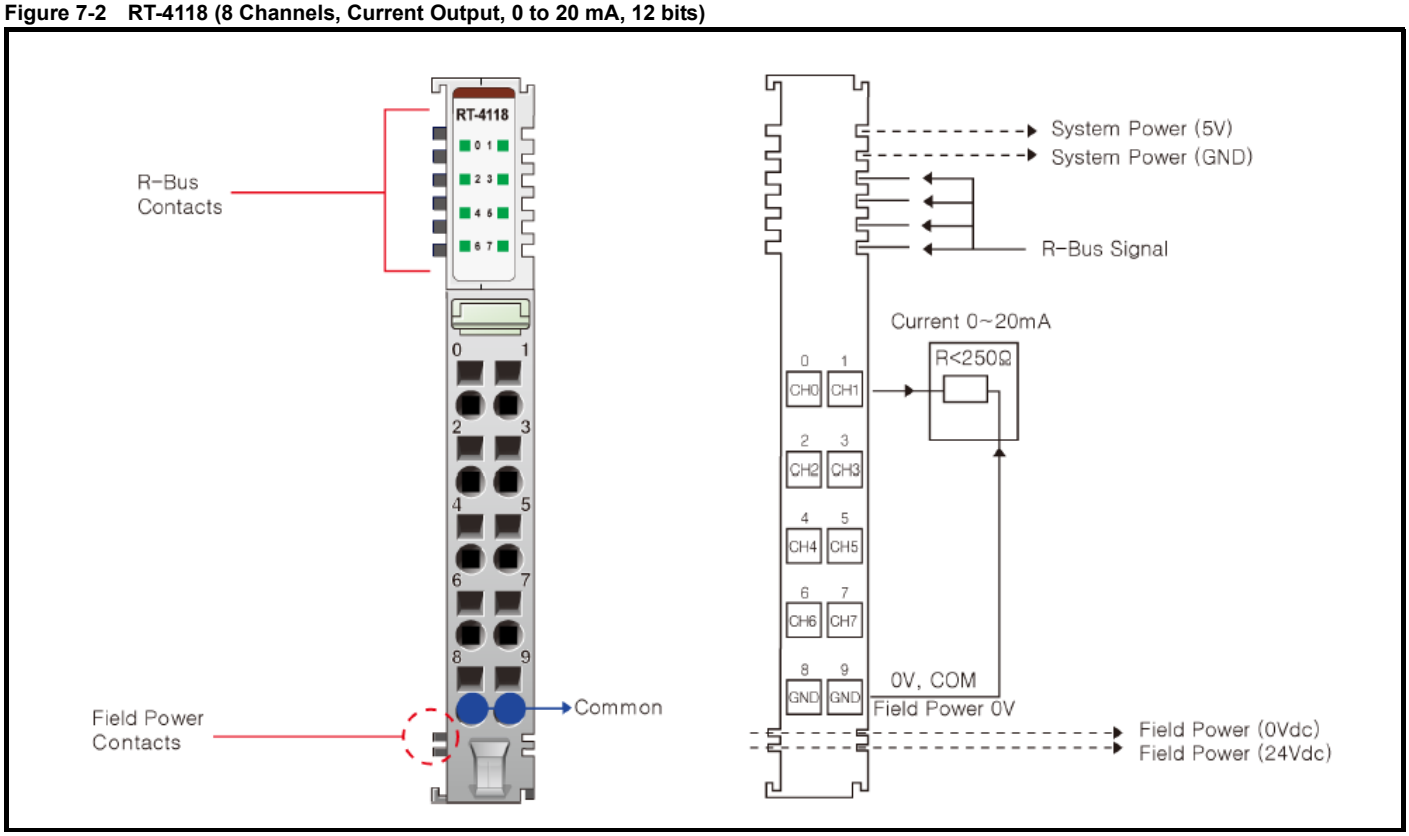
- Valid Parameter length: 4 Bytes
- Parameter data

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Fault Action for channel 3		Fault Action for channel 2		Fault Action for channel 1		Fault Action for channel 0	
	00: Fault Value 01: Hold last state 10: Low Limit 11:High Limit							
Byte 1	Not used							
Byte 2	Fault Value Low Byte							
Byte 3	Not used				Fault Value High Byte			

All values are stored in Bus Coupler`s EEPROM.

7.6 RT-4118 (8 Channels, Current Output, 0 to 20 mA, 12 bits)

Figure 7-2 RT-4118 (8 Channels, Current Output, 0 to 20 mA, 12 bits)



Pin number	Signal description	Signal description	Pin number
0	Analog Output Channel 0	Analog Output Channel 1	1
2	Analog Output Channel 2	Analog Output Channel 3	3
4	Analog Output Channel 4	Analog Output Channel 5	5
6	Analog Output Channel 6	Analog Output Channel 7	7
8	Output Channel Common (AGND)	Output Channel Common (AGND)	9

Table 7-5 Environmental specification

Environmental specifications	
Operating temperature	-20 °C to 60 °C
Storage temperature	-40 °C to 85 °C
Relative humidity	5 % to 90 % non-condensing
Operating altitude	2000 m
Mounting	DIN rail
Output specification	
Outputs Per Module	8 Channels Single Ended
Indicators	8 Green Output Status LEDs
Resolution in Ranges	12 bits: 4.88 uA / bit
Output Current Range	0 to 20 mA
Data Format	16 bits Integer (2's complement)
Module Error	±0.1 % Full Scale @ 25 °C ±0.3 % Full Scale @ -20 °C, 60 °C
Load Resistance	Max. 250 Ω
Diagnostic	Field Power Off: LED Blinking Field Power On: No Output LED Off Field Power On: Output LED ON
Conversion Time	≤0.25 ms / channel
Calibration	Not Required
Common Type	8 Channels / 4 Common
General specifications	
Shock operating	IEC 60068-2-27
Vibration resistance	Sine Vibration (Based on IEC 60068-2-6) - • 5 to 25 Hz: ± 1.6 mm • 25 to 300 Hz: 4 g • Sweep Rate: 1 Oct/min, 20 Sweeps Random Vibration (Based on IEC 60068-2-64) • 10 to 40 Hz: 0.0125 g^2/ Hz • 40 to 100 Hz: 0.0125 → 0.002 g^2 /Hz • 100 to 500 Hz: 0.002 g^2/ Hz • 500 to 2000 Hz: 0.002 → 1.3 x 10-$^4g^2$/ Hz • Test time: 1 hr for each test
EMC resistance burst/ESD	EN 61000-6-2: 2005 EN 61000-6-4/A11: 2011
Installation Pos. / Protect. Class	Variable/IP20
Product certifications	CE, FCC, RoHS, Reach, UL, KC(MSIP-REM-CV3-RT-4118)
Power Dissipation	Max. 100 mA @ 5 Vdc
Isolation	I/O to Logic: Photocoupler Isolation Field power: Non-Isolation
Field Power	Supply Voltage: 24 Vdc nominal Voltage Range: 18 to 32 Vdc
Wiring	I/O Cable Max. 2.0 mm^2 (AWG 14)
Weight	58 g
Module size	12 mm x 99 mm x 70 mm

7.7 RT-4118 LED Indicator

Table 7-6 LED Indicator

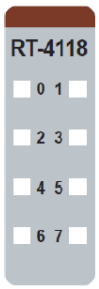
Module	LED number	LED function / description	LED colour
	0	Output Channel 0	Green
	1	Output Channel 1	
	2	Output Channel 2	
	3	Output Channel 3	
	4	Output Channel 4	
	5	Output Channel 5	
	6	Output Channel 6	
	7	Output Channel 7	

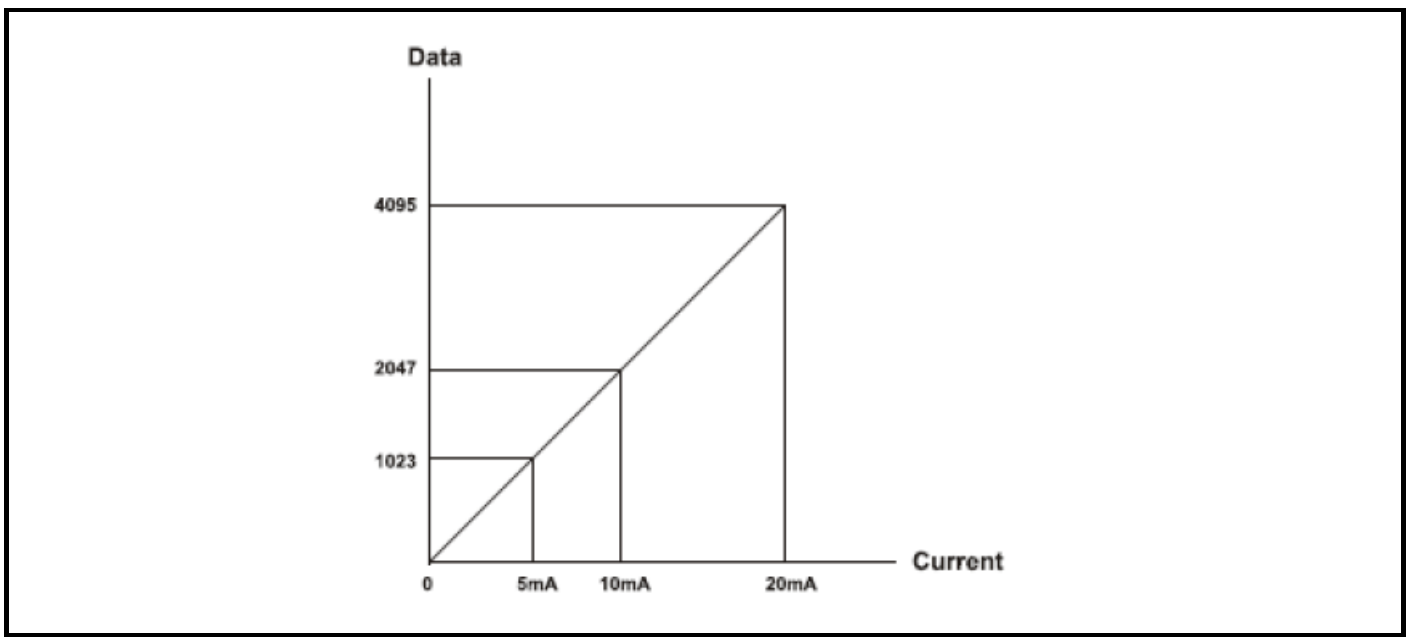
Table 7-7 Channel Status LED

Status	LED	To indicate
Normal Operation	Off	No Output Value
	Green	Normal Operation
Field Power Error	All Channel Repeat the Green and Off	Field power is unconnected

7.8 Data Value / Current

Table 7-8 Current Range: 0 to 20 mA

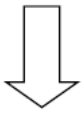
Current	0.0 mA	5.0 mA	10.0 mA	20.0 mA
Data (Hex)	H0000	H03FF	H07FF	H0FFF



7.9 Mapping data into the image table

- Output Image Value

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Analog Output Ch0 Low byte							
Byte 1	Analog Output Ch0 High byte							
Byte 2	Analog Output Ch1 Low byte							
Byte 3	Analog Output Ch1 High byte							
Byte 4	Analog Output Ch2 Low byte							
Byte 5	Analog Output Ch2 High byte							
Byte 6	Analog Output Ch3 Low byte							
Byte 7	Analog Output Ch3 High byte							
Byte 8	Analog Output Ch4 High byte							
Byte 9	Analog Output Ch4 High byte							
Byte 10	Analog Output Ch5 High byte							
Byte 11	Analog Output Ch5 High byte							
Byte 12	Analog Output Ch6 High byte							
Byte 13	Analog Output Ch6 High byte							
Byte 14	Analog Output Ch7 High byte							
Byte 15	Analog Output Ch7 High byte							



- Output Module Data -16 byte Output Data

Analog Output Ch0
Analog Output Ch1
Analog Output Ch2
Analog Output Ch3
Analog Output Ch4
Analog Output Ch5
Analog Output Ch6
Analog Output Ch7

7.10 Parameter data

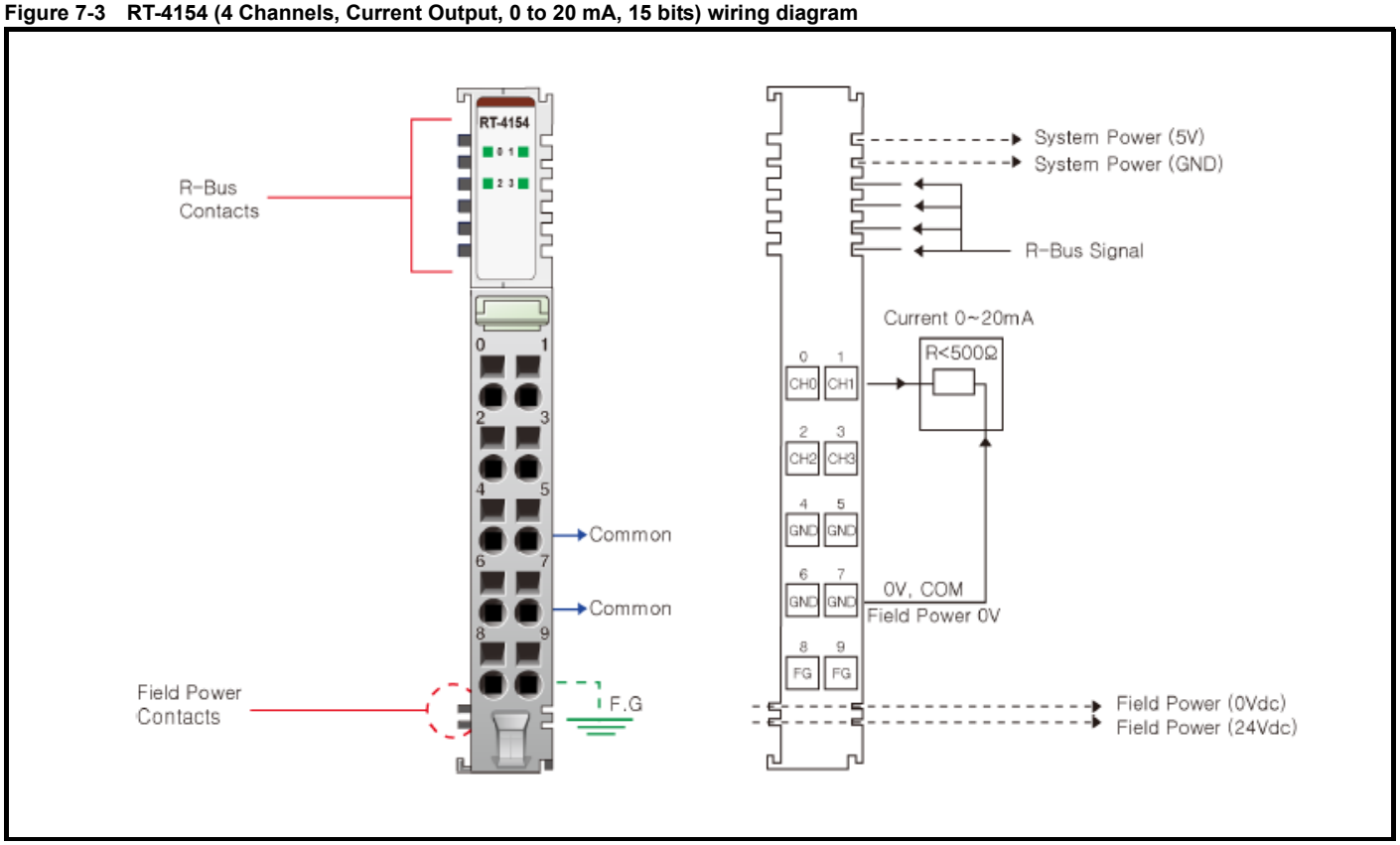
- Valid Parameter length: 4 Bytes
- Parameter data

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Fault Action for channel 3		Fault Action for channel 2		Fault Action for channel 1		Fault Action for channel 0	
	00: Fault Value 01: Hold last state 10: Low Limit 11:High Limit							
Byte 1	Fault Action for channel 7		Fault Action for channel 6		Fault Action for channel 5		Fault Action for channel 4	
	00: Fault Value 01: Hold last state 10: Low Limit 11:High Limit							
Byte 2	Fault Value Low Byte							
Byte 3	Not used				Fault Value High Byte			

All values are stored in Bus Coupler`s EEPROM.

7.11 RT-4154 (4 Channels, Current Output, 0 to 20 mA, 15 bits)

Figure 7-3 RT-4154 (4 Channels, Current Output, 0 to 20 mA, 15 bits) wiring diagram



Pin number	Signal description	Signal description	Pin number
0	Analog Output Channel 0	Analog Output Channel 1	1
2	Analog Output Channel 2	Analog Output Channel 3	3
4	Output Channel Common (AGND)	Output Channel Common (AGND)	5
6	Output Channel Common (AGND)	Output Channel Common (AGND)	7
8	Field Ground	Field Ground	9

Table 7-9 Environmental specification

Environmental specifications	
Operating temperature	-20 °C to 60 °C
Storage temperature	-40 °C to 85 °C
Relative humidity	5 % to 90 % non-condensing
Operating altitude	2000 m
Mounting	DIN rail
Output specification	
Outputs Per Module	4 Channels Single Ended
Indicators	4 Green Output Status LEDs
Resolution in Ranges	15 bits: 0.61uA / bit
Output Current Range	0 to 20 mA
Data Format	16 bits Integer (2's complement)
Module Error	±0.1 % Full Scale @ 25 °C ±0.3 % Full Scale @ -25 °C, 60 °C
Load Resistance	Max. 500 Ω
Diagnostic	Field Power Off: LED Blinking Field Power On: No Output LED Off Field Power On: Output LED ON
Conversion Time	≤0.25 ms / channel
Calibration	Not Required
Common Type	4 Channels / 4 Common
General specifications	
Shock operating	IEC 60068-2-27
Vibration resistance	Sine Vibration (Based on IEC 60068-2-6) - • 5 to 25 Hz: ± 1.6 mm • 25 to 300 Hz: 4 g • Sweep Rate: 1 Oct/min, 20 Sweeps Random Vibration (Based on IEC 60068-2-64) • 10 to 40 Hz: 0.0125 g^2/ Hz • 40 to 100 Hz: 0.0125 → 0.002 g^2 /Hz • 100 to 500 Hz: 0.002 g^2/ Hz • 500 to 2000 Hz: 0.002 → 1.3 x 10-$^4g^2$/ Hz • Test time: 1 hr for each test
EMC resistance burst/ESD	EN 61000-6-2: 2005 EN 61000-6-4/A11: 2011
Installation Pos. / Protect. Class	Variable/IP20
Product certifications	CE, FCC, RoHS, Reach, UL, KC(MSIP-REM-CV3-RT-4154)
Power Dissipation	Max. 100 mA @ 5 Vdc
Wiring	I/O Cable Max. 2.0 mm^2 (AWG 14)
Weight	58 g
Module size	12 mm x 99 mm x 70 mm

7.12 RT-4154 LED Indicator

Table 7-10 LED Indicator

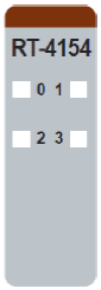
Module	LED number	LED function / description	LED colour
	0	OUTPUT Channel 0	Green
	1	OUTPUT Channel 1	
	2	OUTPUT Channel 2	
	3	OUTPUT Channel 3	

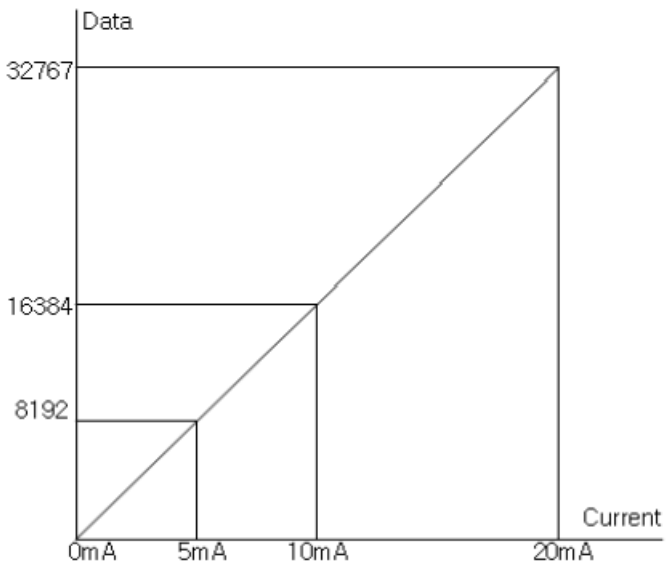
Table 7-11 Channel Status LED

Status	LED	To indicate
Normal Operation	No Output Channel Off	No Output
	Output Channel Green	Output
Field Power Error	All Channel Repeat the Green and Off	Field power is unconnected

7.13 Data Value / Current

Table 7-12 Current Range: 0 to 20 mA

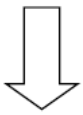
Current	0.0 mA	5.0 mA	10.0 mA	20.0 mA
Data (Hex)	H0000	H2000	H4000	H7FFF



7.14 Mapping data from the image table

- Output Image Value

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Analog Output Ch0 Low byte							
Byte 1	Analog Output Ch0 High byte							
Byte 2	Analog Output Ch1 Low byte							
Byte 3	Analog Output Ch1 High byte							
Byte 4	Analog Output Ch2 Low byte							
Byte 5	Analog Output Ch2 High byte							
Byte 6	Analog Output Ch3 Low byte							
Byte 7	Analog Output Ch3 High byte							



- Output Module Data -8 byte Output Data

Analog Output Ch0
Analog Output Ch1
Analog Output Ch2
Analog Output Ch3

7.15 Parameter data

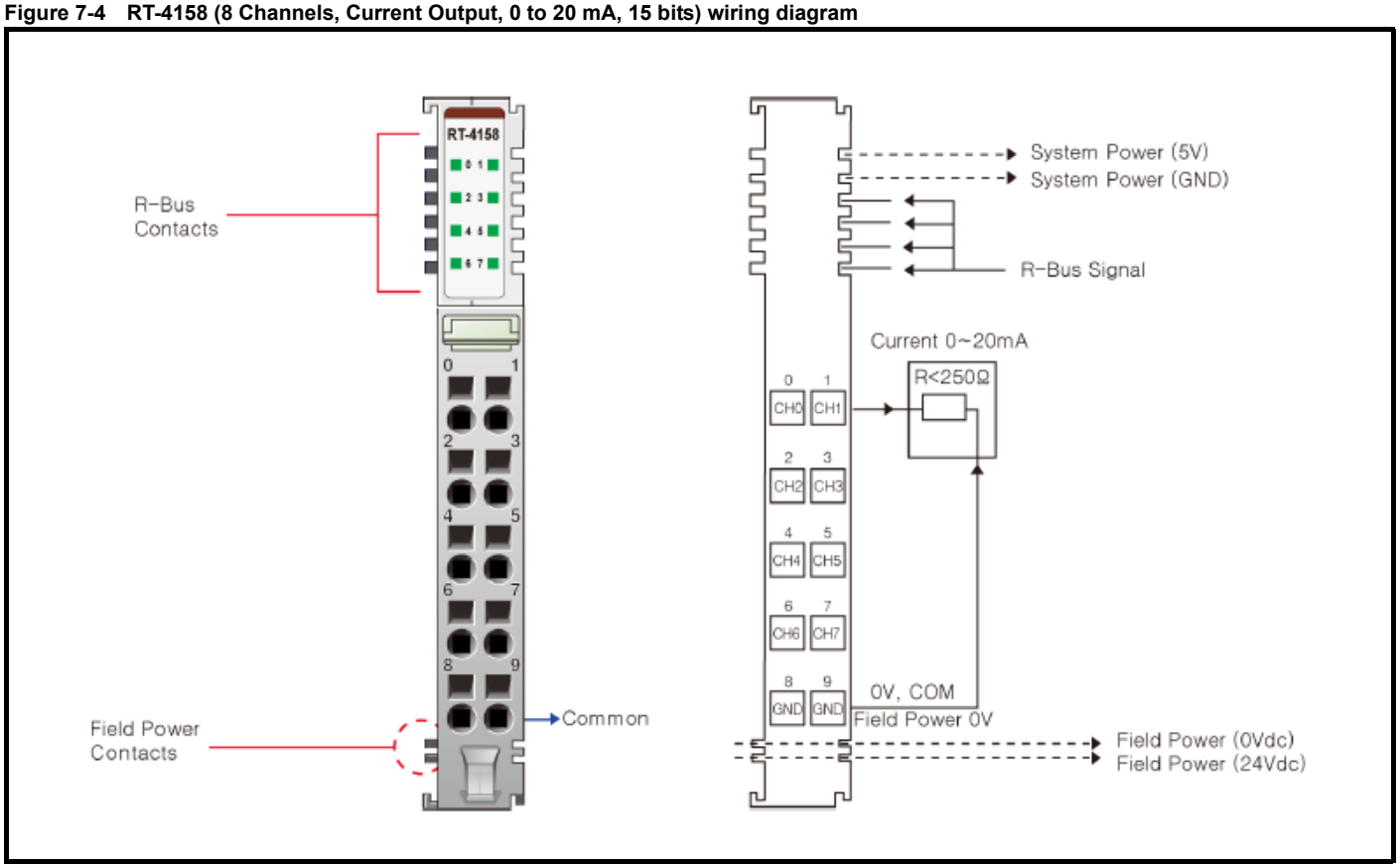
- Valid Parameter length: 4 Bytes
- Parameter data

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Fault Action for channel 3		Fault Action for channel 2		Fault Action for channel 1		Fault Action for channel 0	
	00: Fault Value 01: Hold last state 10: Low Limit 11:High Limit							
Byte 1	Not Used							
Byte 2	Fault Value Low Byte							
Byte 3	Not used				Fault Value High Byte			

All values are stored in Bus Coupler`s EEPROM.

7.16 RT-4158 (8 Channels, Current Output, 0 to 20 mA, 15 bits)

Figure 7-4 RT-4158 (8 Channels, Current Output, 0 to 20 mA, 15 bits) wiring diagram



Pin number	Signal description	Signal description	Pin number
0	Analog Output Channel 0	Analog Output Channel 1	1
2	Analog Output Channel 2	Analog Output Channel 3	3
4	Analog Output Channel 4	Analog Output Channel 5	5
6	Analog Output Channel 6	Analog Output Channel 7	7
8	Output Channel Common (AGND)	Output Channel Common (AGND)	9

Table 7-13 Environmental specification

Environmental specifications	
Operating temperature	-20 °C to 60 °C
Storage temperature	-40 °C to 85 °C
Relative humidity	5 % to 90 % non-condensing
Operating altitude	2000 m
Mounting	DIN rail
Output specification	
Outputs Per Module	8 Channels Single Ended
Indicators	8 Green Output Status LEDs
Resolution in Ranges	15 bits: 0.61 uA / bit
Output Current Range	0 to 20 mA
Data Format	16 bits Integer (2's complement)
Module Error	±0.1 % Full Scale @ 25 °C ±0.3 % Full Scale @ -20 °C, 60 °C
Load Resistance	Max. 250 Ω
Diagnostic	Field Power Off: LED Blinking Field Power On: No Output LED Off Field Power On: Output LED ON
Conversion Time	≤0.25 ms / channel
Calibration	Not Required
Common Type	8 Channels / 4 Common
General specifications	
Shock operating	IEC 60068-2-27
Vibration resistance	Sine Vibration (Based on IEC 60068-2-6) - • 5 to 25 Hz: ± 1.6 mm • 25 to 300 Hz: 4 g • Sweep Rate: 1 Oct/min, 20 Sweeps Random Vibration (Based on IEC 60068-2-64) • 10 to 40 Hz: 0.0125 g^2/ Hz • 40 to 100 Hz: 0.0125 → 0.002 g^2 /Hz • 100 to 500 Hz: 0.002 g^2/ Hz • 500 to 2000 Hz: 0.002 → 1.3 x 10-$^4g^2$/ Hz • Test time: 1 hr for each test
EMC resistance burst/ESD	EN 61000-6-2: 2005 EN 61000-6-4/A11: 2011
Installation Pos. / Protect. Class	Variable/IP20
Product certifications	CE, FCC, RoHS, Reach, UL, KC(MSIP-REM-CV3-RT-4158)
Power Dissipation	Max. 100 mA @ 5 Vdc
Isolation	I/O to Logic: Photocoupler Isolation Field power: Non-Isolation
Field Power	Supply Voltage: 24 Vdc nominal Voltage Range: 18 to 32 Vdc
Wiring	I/O Cable Max. 2.0 mm^2 (AWG 14)
Weight	58 g
Module size	12 mm x 99 mm x 70 mm

7.17 RT-4158 LED Indicator

Table 7-14 LED Indicator

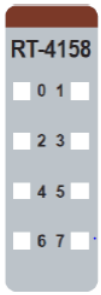
Module	LED number	LED function / description	LED colour
	0	Output Channel 0	Green
	1	Output Channel 1	
	2	Output Channel 2	
	3	Output Channel 3	
	4	Output Channel 4	
	5	Output Channel 5	
	6	Output Channel 6	
	7	Output Channel 7	

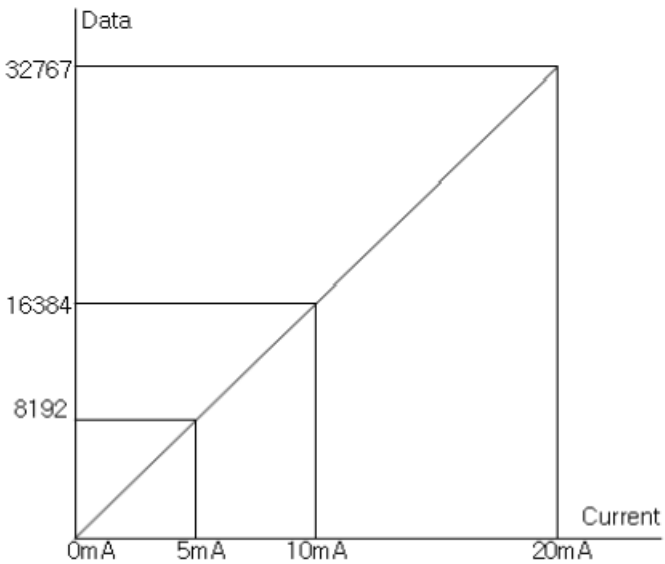
Table 7-15 Channel Status LED

Status	LED	To indicate
Normal Operation	Off	No Output Value
	Green	Normal Operation
Field Power Error	All Channel Repeat the Green and Off	Field power is unconnected

7.18 Data Value / Current

Table 7-16 Current Range: 0 to 20 mA

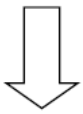
Current	0.0 mA	5.0 mA	10.0 mA	20.0 mA
Data (Hex)	H0000	H2000	H4000	H7FFF



7.19 Mapping data into the image table

- Output Image Value

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Analog Output Ch0 Low byte							
Byte 1	Analog Output Ch0 High byte							
Byte 2	Analog Output Ch1 Low byte							
Byte 3	Analog Output Ch1 High byte							
Byte 4	Analog Output Ch2 Low byte							
Byte 5	Analog Output Ch2 High byte							
Byte 6	Analog Output Ch3 Low byte							
Byte 7	Analog Output Ch3 High byte							
Byte 8	Analog Output Ch4 High byte							
Byte 9	Analog Output Ch4 High byte							
Byte 10	Analog Output Ch5 High byte							
Byte 11	Analog Output Ch5 High byte							
Byte 12	Analog Output Ch6 High byte							
Byte 13	Analog Output Ch6 High byte							
Byte 14	Analog Output Ch7 High byte							
Byte 15	Analog Output Ch7 High byte							



- Output Module Data -16 byte Output Data

Analog Output Ch0
Analog Output Ch1
Analog Output Ch2
Analog Output Ch3
Analog Output Ch4
Analog Output Ch5
Analog Output Ch6
Analog Output Ch7

7.20 Parameter data

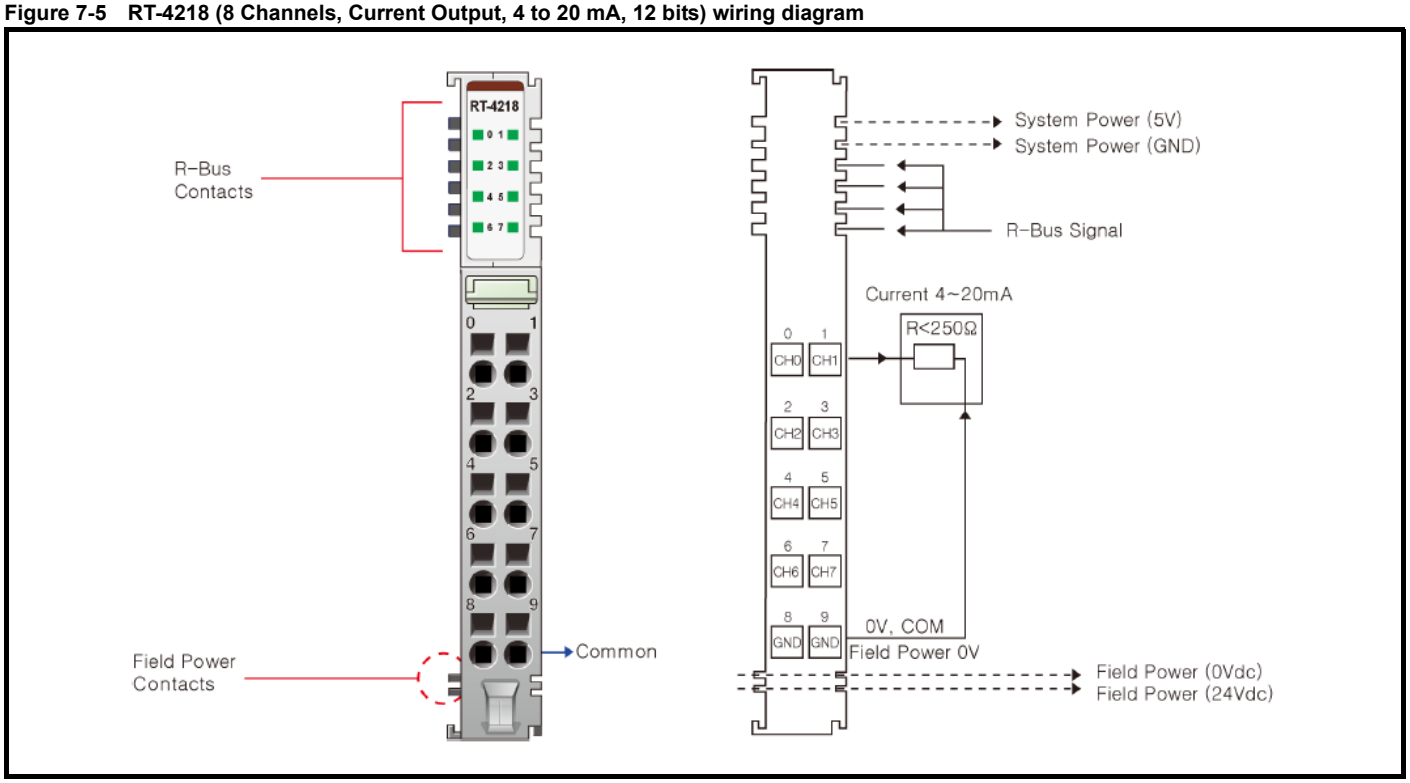
- Valid Parameter length: 4 Bytes
- Parameter data

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Fault Action for channel 3		Fault Action for channel 2		Fault Action for channel 1		Fault Action for channel 0	
	00: Fault Value 01: Hold last state 10: Low Limit 11:High Limit							
Byte 1	Fault Action for channel 7		Fault Action for channel 6		Fault Action for channel 5		Fault Action for channel 4	
	00: Fault Value 01: Hold last state 10: Low Limit 11:High Limit							
Byte 2	Fault Value Low Byte							
Byte 3	Not used				Fault Value High Byte			

All values are stored in Bus Coupler`s EEPROM.

7.21 RT-4218 (8 Channels, Current Output, 4 to 20 mA, 12 bits)

Figure 7-5 RT-4218 (8 Channels, Current Output, 4 to 20 mA, 12 bits) wiring diagram



Pin number	Signal description	Signal description	Pin number
0	Analog Output Channel 0	Analog Output Channel 1	1
2	Analog Output Channel 2	Analog Output Channel 3	3
4	Analog Output Channel 4	Analog Output Channel 5	5
6	Analog Output Channel 6	Analog Output Channel 7	7
8	Output Channel Common (AGND)	Output Channel Common (AGND)	9

Table 7-17 Environmental specification

Environmental specifications	
Operating temperature	-20 °C to 60 °C
Storage temperature	-40 °C to 85 °C
Relative humidity	5 % to 90 % non-condensing
Operating altitude	2000 m
Mounting	DIN rail
Output specification	
Outputs Per Module	8 Channels Single Ended
Indicators	8 Green Output Status LEDs
Resolution in Ranges	12 bits: 3.91 uA / bit
Output Current Range	4 to 20 mA
Data Format	16 bits Integer (2's complement)
Module Error	±0.1 % Full Scale @ 25 °C ±0.3 % Full Scale @ -20 °C, 60 °C
Load Resistance	Max. 250 Ω
Diagnostic	Field Power Off: LED Blinking Field Power On: No Output LED Off Field Power On: Output LED ON
Conversion Time	≤0.25 ms / channel
Calibration	Not Required
Common Type	8 Channels / 2 Common
General specifications	
Shock operating	IEC 60068-2-27
Vibration resistance	Sine Vibration (Based on IEC 60068-2-6) - • 5 to 25 Hz: ± 1.6 mm • 25 to 300 Hz: 4 g • Sweep Rate: 1 Oct/min, 20 Sweeps Random Vibration (Based on IEC 60068-2-64) • 10 to 40 Hz: 0.0125 g^2/ Hz • 40 to 100 Hz: 0.0125 → 0.002 g^2 /Hz • 100 to 500 Hz: 0.002 g^2/ Hz • 500 to 2000 Hz: 0.002 → 1.3 x 10-$^4g^2$/ Hz • Test time: 1 hr for each test
EMC resistance burst/ESD	EN 61000-6-2: 2005 EN 61000-6-4/A11: 2011
Installation Pos. / Protect. Class	Variable/IP20
Product certifications	CE, FCC, RoHS, Reach, UL, KC(MSIP-REM-CV3-RT-4218)
Power Dissipation	Max. 100 mA @ 5 Vdc
Isolation	I/O to Logic: Photocoupler Isolation Field power: Non-Isolation
Field Power	Supply Voltage: 24 Vdc nominal Voltage Range: 18 to 32 Vdc
Wiring	I/O Cable Max. 2.0 mm^2 (AWG 14)
Weight	58 g
Module size	12 mm x 99 mm x 70 mm

7.22 RT-4218 LED Indicator

Table 7-18 LED Indicator

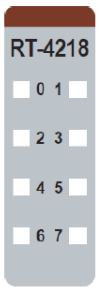
Module	LED number	LED function / description	LED colour
	0	Output Channel 0	Green
	1	Output Channel 1	
	2	Output Channel 2	
	3	Output Channel 3	
	4	Output Channel 4	
	5	Output Channel 5	
	6	Output Channel 6	
	7	Output Channel 7	

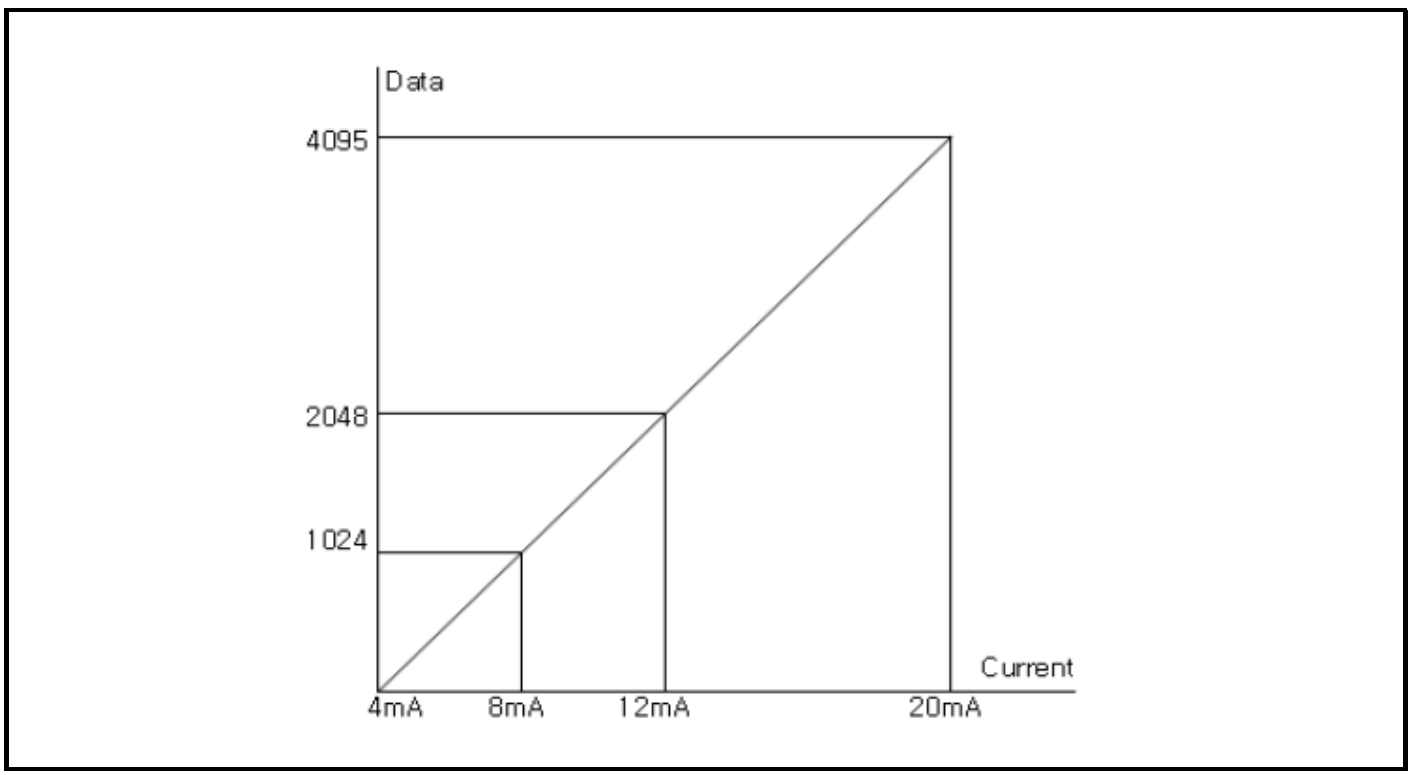
Table 7-19 Channel Status LED

Status	LED	To indicate
Normal Operation	Off	No Output Value
	Green	Normal Operation
Field Power Error	All Channel Repeat the Green and Off	Field power is unconnected

7.23 Data Value / Current

Table 7-20 Current Range: 4 to 20 mA

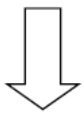
Current	4.0 mA	8.0 mA	12.0 mA	20.0 mA
Data (Hex)	H0000	H03FF	H07FF	H0FFF



7.24 Mapping data into the image table

- Output Image Value

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Analog Output Ch0 Low byte							
Byte 1	Analog Output Ch0 High byte							
Byte 2	Analog Output Ch1 Low byte							
Byte 3	Analog Output Ch1 High byte							
Byte 4	Analog Output Ch2 Low byte							
Byte 5	Analog Output Ch2 High byte							
Byte 6	Analog Output Ch3 Low byte							
Byte 7	Analog Output Ch3 High byte							
Byte 8	Analog Output Ch4 High byte							
Byte 9	Analog Output Ch4 High byte							
Byte 10	Analog Output Ch5 High byte							
Byte 11	Analog Output Ch5 High byte							
Byte 12	Analog Output Ch6 High byte							
Byte 13	Analog Output Ch6 High byte							
Byte 14	Analog Output Ch7 High byte							
Byte 15	Analog Output Ch7 High byte							



- Output Module Data -16 byte Output Data

Analog Output Ch0
Analog Output Ch1
Analog Output Ch2
Analog Output Ch3
Analog Output Ch4
Analog Output Ch5
Analog Output Ch6
Analog Output Ch7

7.25 Parameter data

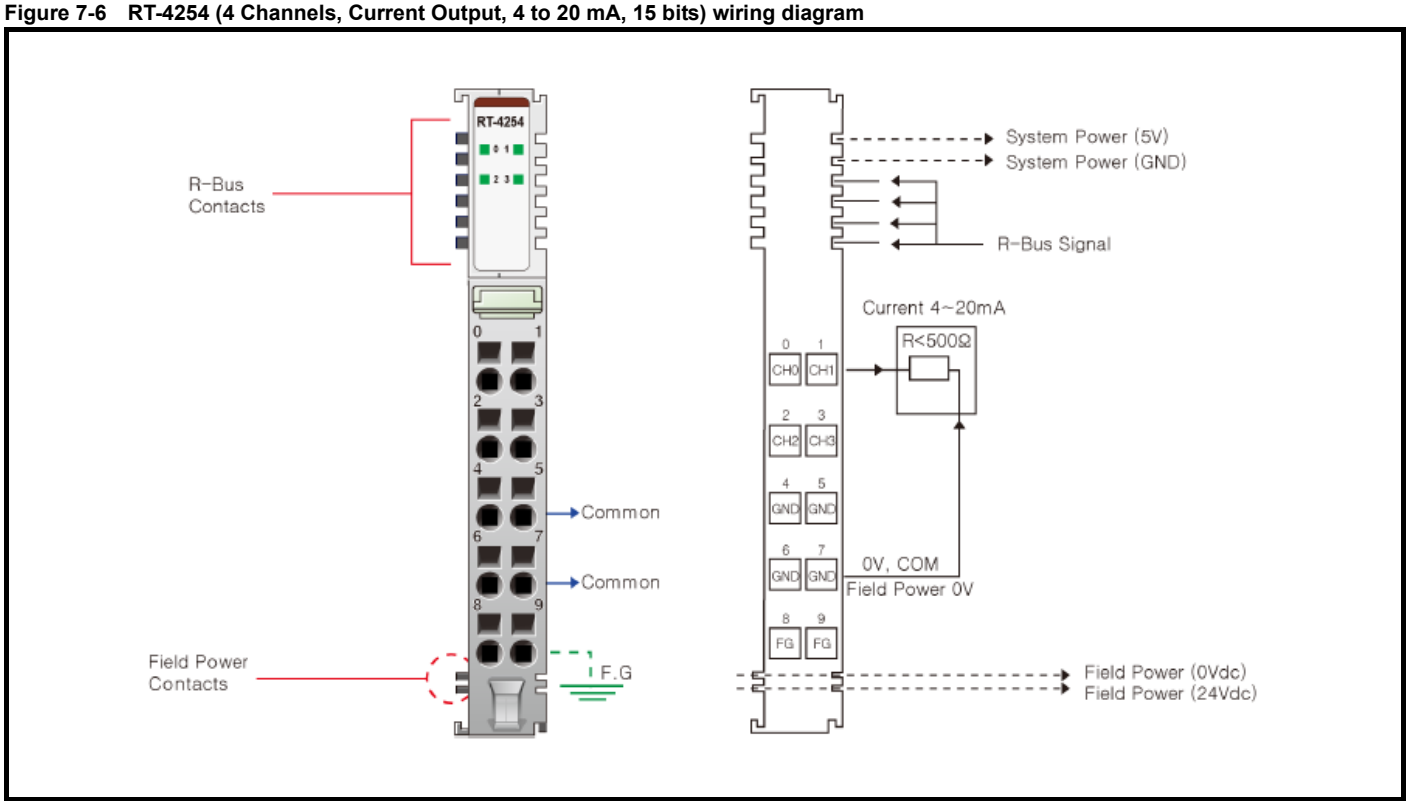
- Valid Parameter length: 4 Bytes
- Parameter data

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Fault Action for channel 3		Fault Action for channel 2		Fault Action for channel 1		Fault Action for channel 0	
	00: Fault Value 01: Hold last state 10: Low Limit 11:High Limit							
Byte 1	Fault Action for channel 7		Fault Action for channel 6		Fault Action for channel 5		Fault Action for channel 4	
	00: Fault Value 01: Hold last state 10: Low Limit 11:High Limit							
Byte 2	Fault Value Low Byte							
Byte 3	Not used				Fault Value High Byte			

All values are stored in Bus Coupler`s EEPROM

7.26 RT-4254 (4 Channels, Current Output, 4 to 20 mA, 15 bits)

Figure 7-6 RT-4254 (4 Channels, Current Output, 4 to 20 mA, 15 bits) wiring diagram



Pin number	Signal description	Signal description	Pin number
0	Analog Output Channel 0	Analog Output Channel 1	1
2	Analog Output Channel 2	Analog Output Channel 3	3
4	Output Channel Common (AGND)	Output Channel Common (AGND)	5
6	Output Channel Common (AGND)	Output Channel Common (AGND)	7
8	Field Ground	Field Ground	9

Table 7-21 Environmental specification

Environmental specifications	
Operating temperature	-20 °C to 60 °C
Storage temperature	-40 °C to 85 °C
Relative humidity	5 % to 90 % non-condensing
Operating altitude	2000 m
Mounting	DIN rail
Output specification	
Outputs Per Module	4 Channels Single Ended
Indicators	4 Green Output Status LEDs
Resolution in Ranges	15 bits: 0.49 uA / bit
Output Current Range	0 to 20 mA
Data Format	16 bits Integer (2's complement)
Module Error	±0.1 % Full Scale @ 25 °C ±0.3 % Full Scale @ -25 °C, 60 °C
Load Resistance	Max. 500 Ω
Diagnostic	Field Power Off: LED Blinking Field Power On: No Output LED Off Field Power On: Output LED ON
Conversion Time	≤0.25 ms / channel
Calibration	Not Required
Common Type	4 Channels / 4 Common
General specifications	
Shock operating	IEC 60068-2-27
Vibration resistance	Sine Vibration (Based on IEC 60068-2-6) - • 5 to 25 Hz: ± 1.6 mm • 25 to 300 Hz: 4 g • Sweep Rate: 1 Oct/min, 20 Sweeps Random Vibration (Based on IEC 60068-2-64) • 10 to 40 Hz: 0.0125 g^2/ Hz • 40 to 100 Hz: 0.0125 → 0.002 g^2 /Hz • 100 to 500 Hz: 0.002 g^2/ Hz • 500 to 2000 Hz: 0.002 → 1.3 x 10-$^4g^2$/ Hz • Test time: 1 hr for each test
EMC resistance burst/ESD	EN 61000-6-2: 2005 EN 61000-6-4/A11: 2011
Installation Pos. / Protect. Class	Variable/IP20
Product certifications	CE, FCC, RoHS, Reach, UL, KC(MSIP-REM-CV3-RT-4254)
Power Dissipation	Max. 100 mA @ 5 Vdc
Isolation	I/O to Logic: Photocoupler Isolation Field power: Non-Isolation
Wiring	I/O Cable Max. 2.0 mm^2 (AWG 14)
Weight	58 g
Module size	12 mm x 99 mm x 70 mm

7.27 RT-4254 LED Indicator

Table 7-22 LED Indicator

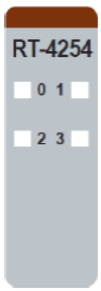
Module	LED number	LED function / description	LED colour
	0	OUTPUT Channel 0	Green
	1	OUTPUT Channel 1	
	2	OUTPUT Channel 2	
	3	OUTPUT Channel 3	

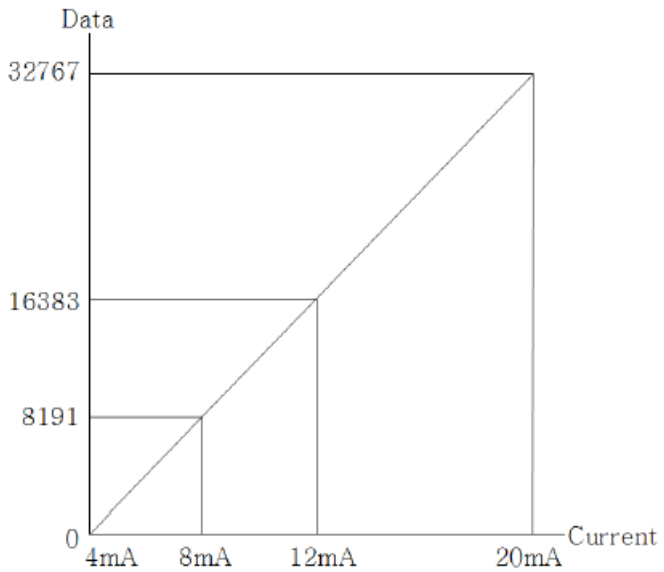
Table 7-23 Channel Status LED

Status	LED	To indicate
Normal Operation	Off	No Output Value
	Green	Normal Operation
Field Power Error	All Channel Repeat the Green and Off	Field power is unconnected

7.28 Data Value / Current

Table 7-24 Current Range: 4 to 20 mA

Current	4.0 mA	8.0 mA	12.0 mA	20.0 mA
Data (Hex)	H0000	H1FFF	H3FFF	H7FFF



7.29 Mapping data from the image table

- Output Image Value

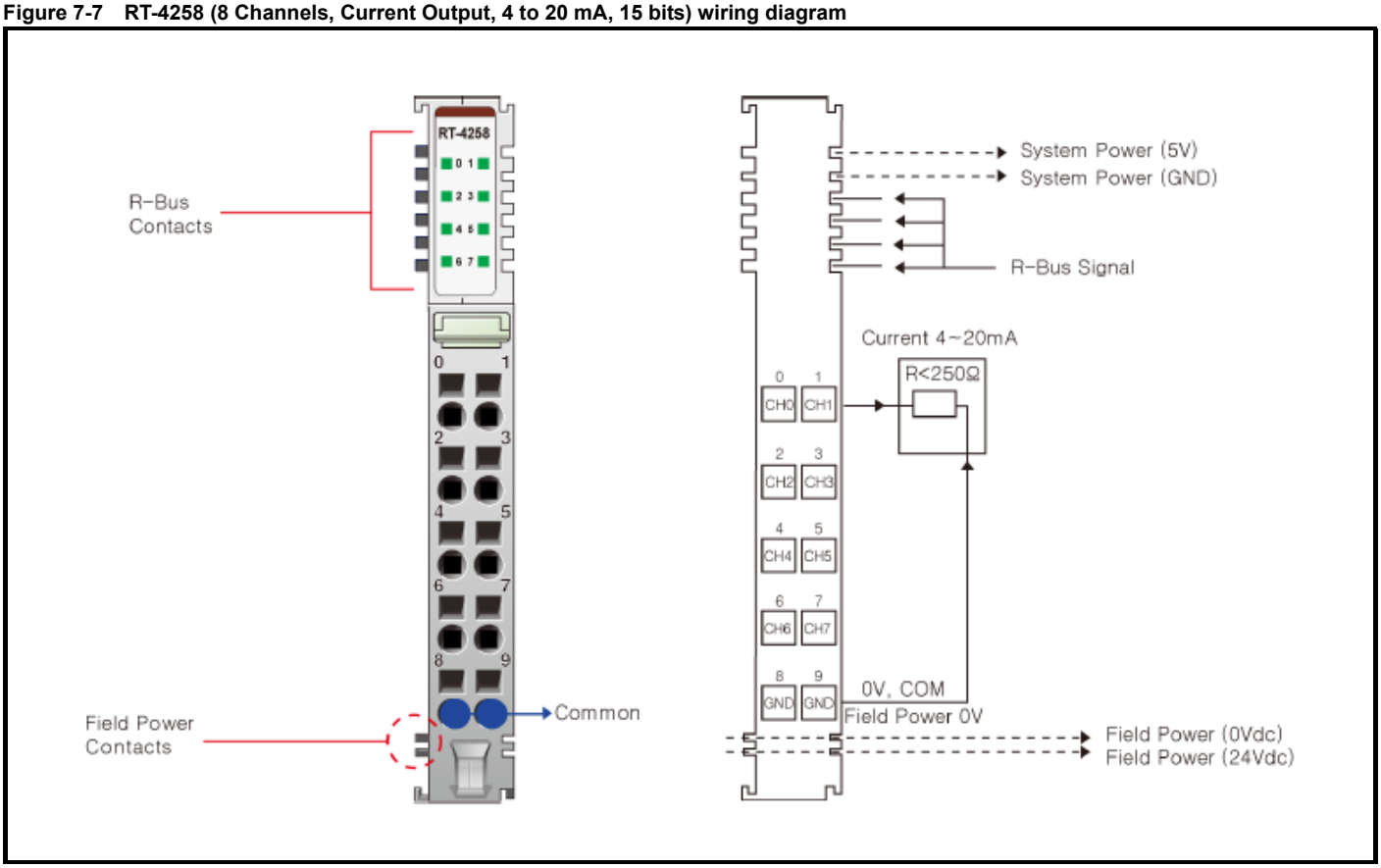
Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Analog Output Ch0 Low byte							
Byte 1	Analog Output Ch0 High byte							
Byte 2	Analog Output Ch1 Low byte							
Byte 3	Analog Output Ch1 High byte							
Byte 4	Analog Output Ch2 Low byte							
Byte 5	Analog Output Ch2 High byte							
Byte 6	Analog Output Ch3 Low byte							
Byte 7	Analog Output Ch3 High byte							

- Output Module Data -8 byte Output Data

Analog Output Ch0
Analog Output Ch1
Analog Output Ch2
Analog Output Ch3

7.30 RT-4258 (8 Channels, Current Output, 4 to 20 mA, 15 bits)

Figure 7-7 RT-4258 (8 Channels, Current Output, 4 to 20 mA, 15 bits) wiring diagram



Pin number	Signal description	Signal description	Pin number
0	Analog Output Channel 0	Analog Output Channel 1	1
2	Analog Output Channel 2	Analog Output Channel 3	3
4	Analog Output Channel 4	Analog Output Channel 5	5
6	Analog Output Channel 6	Analog Output Channel 7	7
8	Output Channel Common (AGND)	Output Channel Common (AGND)	9

Table 7-25 Environmental specification

Environmental specifications	
Operating temperature	-20 °C to 60 °C
Storage temperature	-40 °C to 85 °C
Relative humidity	5 % to 90 % non-condensing
Operating altitude	2000 m
Mounting	DIN rail
Output specification	
Outputs Per Module	8 Channels Single Ended
Indicators	8 Green Output Status LEDs
Resolution in Ranges	15 bits: 0.49 uA / bit
Output Current Range	4 to 20 mA
Data Format	16 bits Integer (2's complement)
Module Error	±0.1 % Full Scale @ 25 °C ±0.3 % Full Scale @ -20 °C, 60 °C
Load Resistance	Max. 250 Ω
Diagnostic	Field Power Off: LED Blinking Field Power On: No Output LED Off Field Power On: Output LED ON
Conversion Time	≤0.25 ms / channel
Calibration	Not Required
Common Type	8 Channels / 2 Common
General specifications	
Shock operating	IEC 60068-2-27
Vibration resistance	Sine Vibration (Based on IEC 60068-2-6) - • 5 to 25 Hz: ± 1.6 mm • 25 to 300 Hz: 4 g • Sweep Rate: 1 Oct/min, 20 Sweeps Random Vibration (Based on IEC 60068-2-64) • 10 to 40 Hz: 0.0125 g^2/ Hz • 40 to 100 Hz: 0.0125 → 0.002 g^2 /Hz • 100 to 500 Hz: 0.002 g^2/ Hz • 500 to 2000 Hz: 0.002 → 1.3 x $10^{-4}g^2$/ Hz • Test time: 1 hr for each test
EMC resistance burst/ESD	EN 61000-6-2: 2005 EN 61000-6-4/A11: 2011
Installation Pos. / Protect. Class	Variable/IP20
Product certifications	CE, FCC, RoHS, Reach, UL, KC(MSIP-REM-CV3-RT-4258)
Power Dissipation	Max. 100 mA @ 5 Vdc
Isolation	I/O to Logic: Photocoupler Isolation Field power: Non-Isolation
Field Power	Supply Voltage: 24 Vdc nominal Voltage Range: 18 to 32 Vdc
Wiring	I/O Cable Max. 2.0 mm^2 (AWG 14)
Weight	58 g
Module size	12 mm x 99 mm x 70 mm

7.31 RT-4258 LED Indicator

Table 7-26 LED Indicator

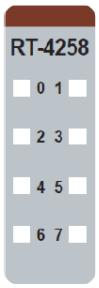
Module	LED number	LED function / description	LED colour
	0	Output Channel 0	Green
	1	Output Channel 1	
	2	Output Channel 2	
	3	Output Channel 3	
	4	Output Channel 4	
	5	Output Channel 5	
	6	Output Channel 6	
	7	Output Channel 7	

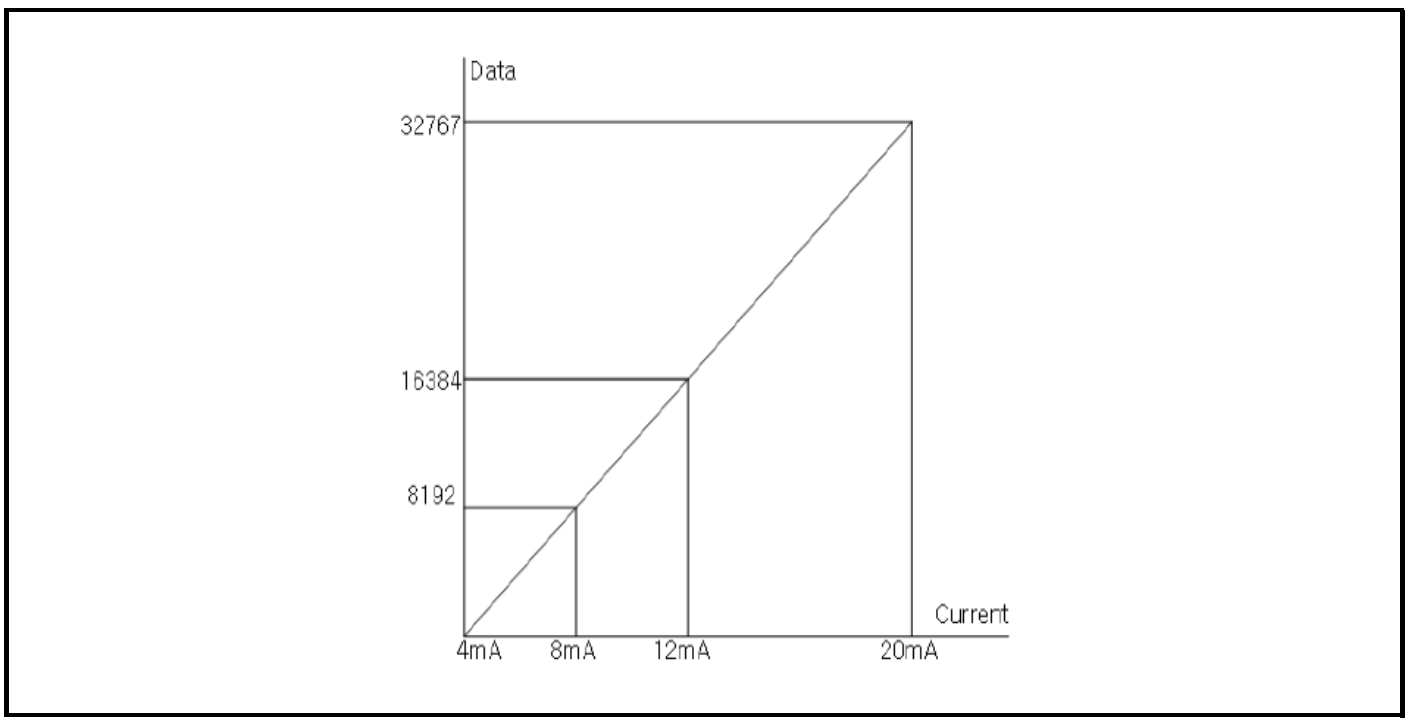
Table 7-27 Channel Status LED

Status	LED	To indicate
Normal Operation	Off	No Output Value
	Green	Normal Operation
Field Power Error	All Channel Repeat the Green and Off	Field power is unconnected

7.32 Data Value / Current

Table 7-28 Current Range: 4 to 20 mA

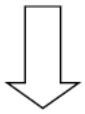
Current	4.0 mA	8.0 mA	12.0 mA	20.0 mA
Data (Hex)	H0000	H2000	H4000	H7FFF



7.33 Mapping data into the image table

- Output Image Value

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Analog Output Ch0 Low byte							
Byte 1	Analog Output Ch0 High byte							
Byte 2	Analog Output Ch1 Low byte							
Byte 3	Analog Output Ch1 High byte							
Byte 4	Analog Output Ch2 Low byte							
Byte 5	Analog Output Ch2 High byte							
Byte 6	Analog Output Ch3 Low byte							
Byte 7	Analog Output Ch3 High byte							
Byte 8	Analog Output Ch4 High byte							
Byte 9	Analog Output Ch4 High byte							
Byte 10	Analog Output Ch5 High byte							
Byte 11	Analog Output Ch5 High byte							
Byte 12	Analog Output Ch6 High byte							
Byte 13	Analog Output Ch6 High byte							
Byte 14	Analog Output Ch7 High byte							
Byte 15	Analog Output Ch7 High byte							



- Output Module Data -16 byte Output Data

Analog Output Ch0
Analog Output Ch1
Analog Output Ch2
Analog Output Ch3
Analog Output Ch4
Analog Output Ch5
Analog Output Ch6
Analog Output Ch7

7.34 Parameter data

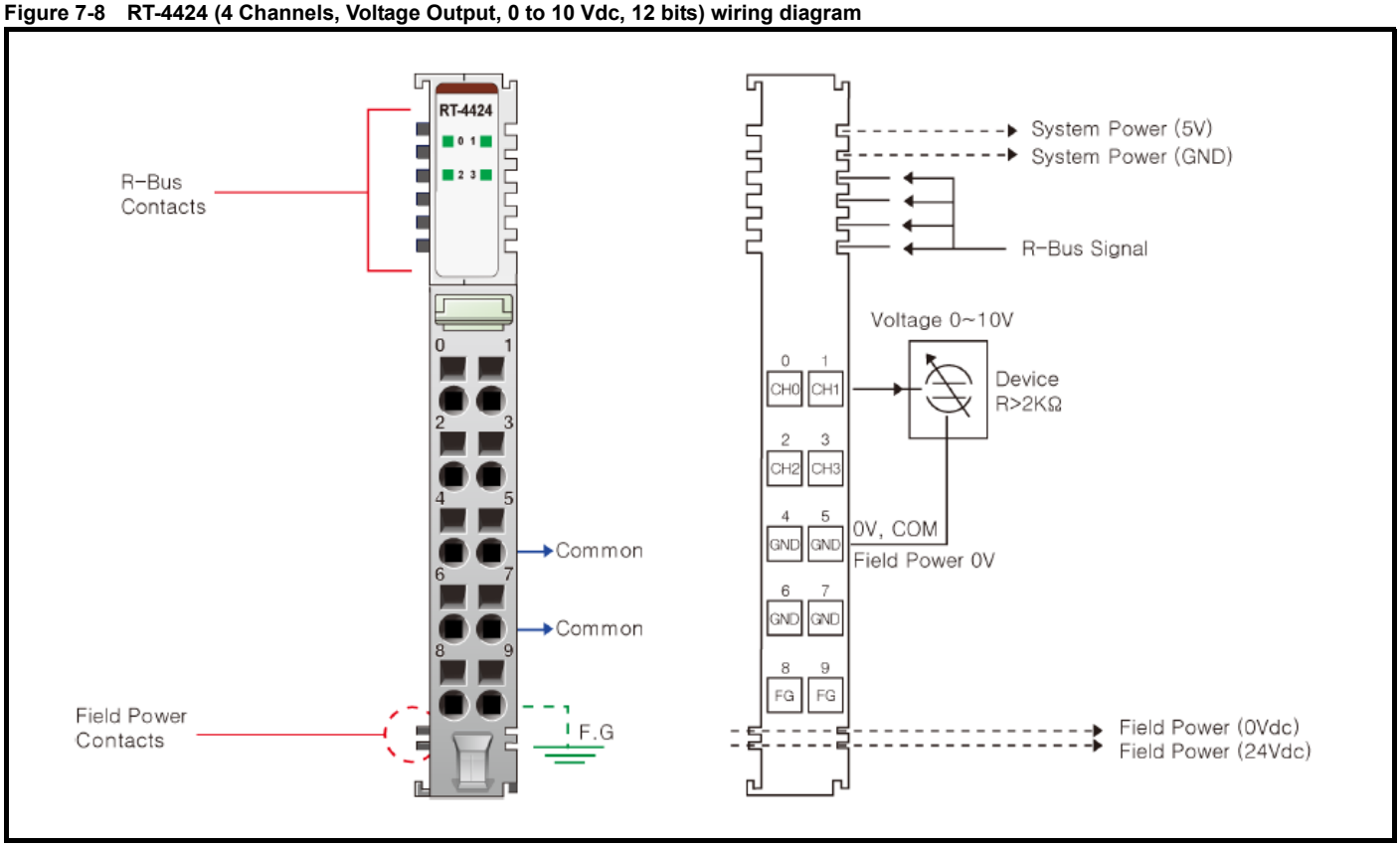
- Valid Parameter length: 4 Bytes
- Parameter data

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Fault Action for channel 3		Fault Action for channel 2		Fault Action for channel 1		Fault Action for channel 0	
	00: Fault Value 01: Hold last state 10: Low Limit 11:High Limit							
Byte 1	Fault Action for channel 7		Fault Action for channel 6		Fault Action for channel 5		Fault Action for channel 4	
	00: Fault Value 01: Hold last state 10: Low Limit 11:High Limit							
Byte 2	Fault Value Low Byte							
Byte 3	Not used				Fault Value High Byte			

All values are stored in Bus Coupler`s EEPROM

7.35 RT-4424 (4 Channels, Voltage Output, 0 to 10 Vdc, 12 bits)

Figure 7-8 RT-4424 (4 Channels, Voltage Output, 0 to 10 Vdc, 12 bits) wiring diagram



Pin number	Signal description	Signal description	Pin number
0	Analog Output Channel 0	Analog Output Channel 1	1
2	Analog Output Channel 2	Analog Output Channel 3	3
4	Output Channel Common (AGND)	Output Channel Common (AGND)	5
6	Output Channel Common (AGND)	Output Channel Common (AGND)	7
8	Field Ground	Field Ground	9

Table 7-29 Environmental specification

Environmental specifications	
Operating temperature	-20 °C to 60 °C
Storage temperature	-40 °C to 85 °C
Relative humidity	5 % to 90 % non-condensing
Operating altitude	2000 m
Mounting	DIN rail
Output specification	
Outputs Per Module	4 Channels Single Ended
Indicators	4 Green Output Status LEDs
Resolution in Ranges	12 bits: 2.44 mV/ bit
Output Voltage Range	0 to 10 Vdc
Data Format	16 bits Integer (2's complement)
Module Error	±0.1 % Full Scale @ 25 °C ±0.3 % Full Scale @ -20 °C, 60 °C
Load Resistance	Min. 2 kΩ
Diagnostic	Field Power Off: LED Blinking Field Power On: No Output LED Off Field Power On: Output LED ON
Conversion Time	≤0.25 ms / channel
Calibration	Not Required
Common Type	4 Channels / 4 Common
General specifications	
Shock operating	IEC 60068-2-27
Vibration resistance	Sine Vibration (Based on IEC 60068-2-6) - • 5 to 25 Hz: ± 1.6 mm • 25 to 300 Hz: 4 g • Sweep Rate: 1 Oct/min, 20 Sweeps Random Vibration (Based on IEC 60068-2-64) • 10 to 40 Hz: 0.0125 g^2/ Hz • 40 to 100 Hz: 0.0125 → 0.002 g^2 /Hz • 100 to 500 Hz: 0.002 g^2/ Hz • 500 to 2000 Hz: 0.002 → 1.3 x 10-$^4g^2$/ Hz • Test time: 1 hr for each test
EMC resistance burst/ESD	EN 61000-6-2: 2005 EN 61000-6-4/A11: 2011
Installation Pos. / Protect. Class	Variable/IP20
Product certifications	CE, FCC, RoHS, Reach, UL, KC(MSIP-REM-CV3-RT-4424)
Power Dissipation	Max. 100 mA @ 5 Vdc
Isolation	I/O to Logic: Photocoupler Isolation Field power: Non-Isolation
Field Power	Supply Voltage: 24 Vdc nominal Voltage Range: 18 to 32 Vdc
Wiring	I/O Cable Max. 2.0 mm^2 (AWG 14)
Weight	58 g
Module size	12 mm x 99 mm x 70 mm

7.36 RT-4424 LED Indicator

Table 7-30 LED Indicator

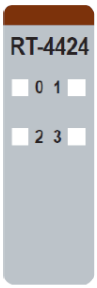
Module	LED number	LED function / description	LED colour
	0	OUTPUT Channel 0	Green
	1	OUTPUT Channel 1	
	2	OUTPUT Channel 2	
	3	OUTPUT Channel 3	

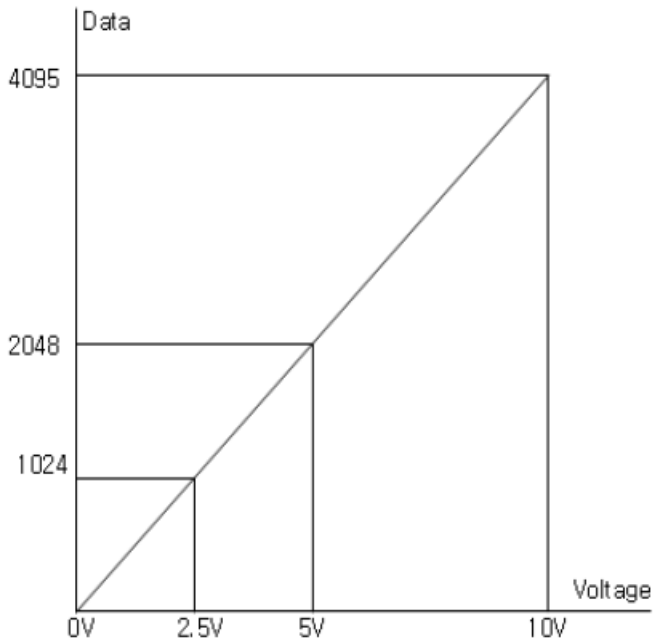
Table 7-31 Channel Status LED

Status	LED	To indicate
Normal Operation	Off	No Output Value
	Green	Normal Operation
Field Power Error	All Channel Repeat the Green and Off	Field power is unconnected

7.37 Data Value / Voltage

Table 7-32 Voltage Range: 0 to 10 Vdc

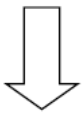
Current	0.0 V	2.5 V	5.0 V	10.0 V
Data (Hex)	H0000	H03FF	H07FF	H0FFF



7.38 Mapping data from the image table

- Output Image Value

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Analog Output Ch0 Low byte							
Byte 1	Analog Output Ch0 High byte							
Byte 2	Analog Output Ch1 Low byte							
Byte 3	Analog Output Ch1 High byte							
Byte 4	Analog Output Ch2 Low byte							
Byte 5	Analog Output Ch2 High byte							
Byte 6	Analog Output Ch3 Low byte							
Byte 7	Analog Output Ch3 High byte							



- Output Module Data -8byte Output Data

Analog Output Ch0
Analog Output Ch1
Analog Output Ch2
Analog Output Ch3

7.39 Parameter data

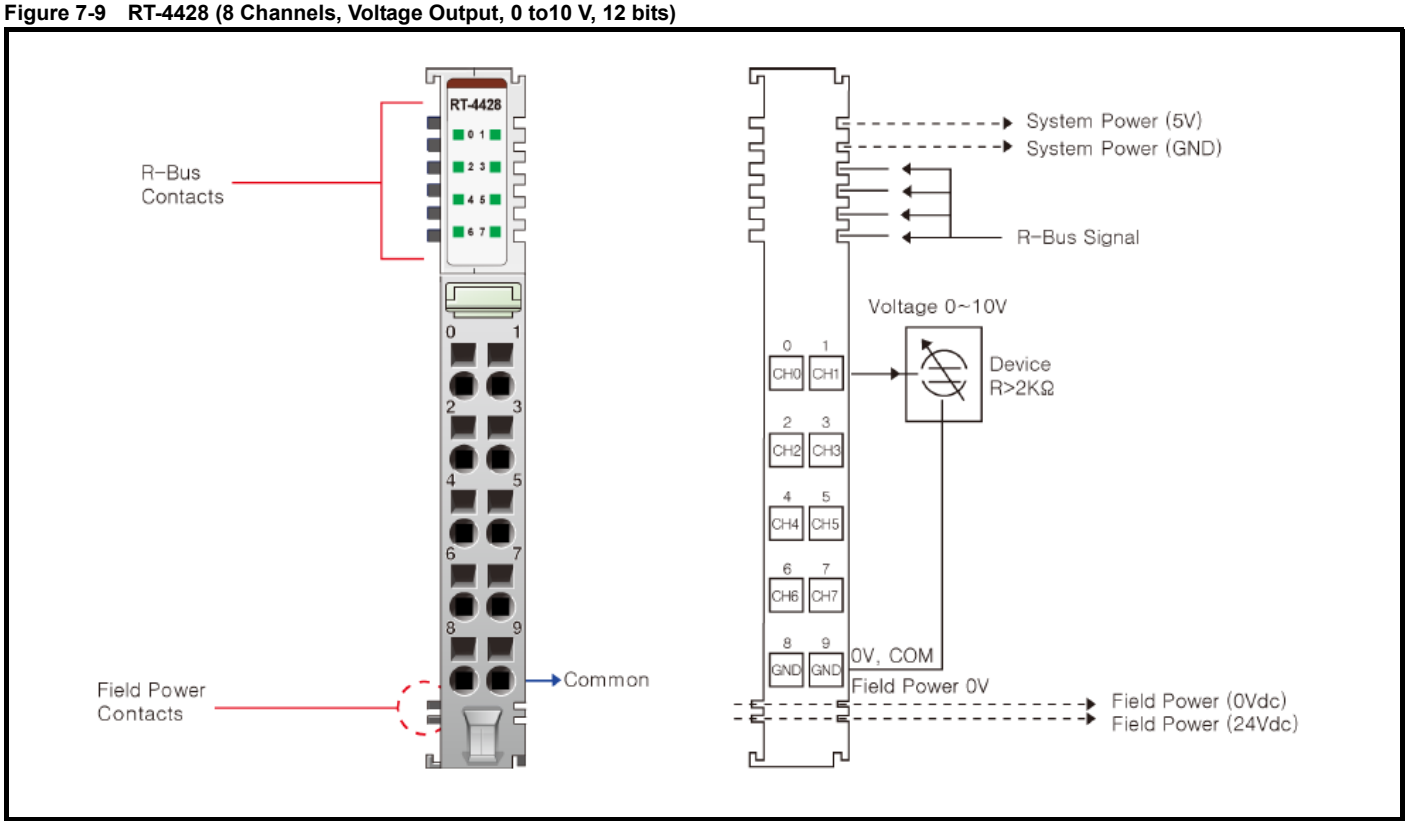
- Valid Parameter length: 4 Bytes
- Parameter data

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Fault Action for channel 3		Fault Action for channel 2		Fault Action for channel 1		Fault Action for channel 0	
	00: Fault Value 01: Hold last state 10: Low Limit 11:High Limit							
Byte 1	Not Used							
Byte 2	Fault Value Low Byte							
Byte 3	Not used				Fault Value High Byte			

All values are stored in Bus Coupler`s EEPROM.

7.40 RT-4428 (8 Channels, Voltage Output, 0 to10 V, 12 bits)

Figure 7-9 RT-4428 (8 Channels, Voltage Output, 0 to10 V, 12 bits)



Pin number	Signal Description	Signal Description	Pin number
0	Analog Output Channel 0	Analog Output Channel 1	1
2	Analog Output Channel 2	Analog Output Channel 3	3
4	Analog Output Channel 4	Analog Output Channel 5	5
6	Analog Output Channel 6	Analog Output Channel 7	7
8	Output Channel Common (AGND)	Output Channel Common (AGND)	9

Table 7-33 Environmental specification

Environmental specifications	
Operating temperature	-20 °C to 60 °C
Storage temperature	-40 °C to 85 °C
Relative humidity	5 % to 95 % non-condensing
Operating altitude	2000 m
Mounting	DIN rail
Output specification	
Outputs Per Module	8 Channels Single Ended
Indicators	8 Green Output Status LEDs
Resolution in Ranges	12 bits: 2.44 mV/ bit
Output Voltage Range	0 to 10 Vdc
Data Format	16 bits Integer (2's complement)
Module Error	±0.1 % Full Scale @ 25 °C ±0.3 % Full Scale @ -20 °C, 60 °C
Load Resistance	Min. 2 kΩ
Diagnostic	Field Power Off: LED Blinking Field Power On: No Output LED Off Field Power On: Output LED ON
Conversion Time	≤0.25 ms / channel
Calibration	Not Required
Common Type	8 Channels / 4 Common
General specifications	
Shock operating	IEC 60068-2-27
Vibration resistance	Sine Vibration (Based on IEC 60068-2-6) - • 5 to 25 Hz: ± 1.6 mm • 25 to 300 Hz: 4 g • Sweep Rate: 1 Oct/min, 20 Sweeps Random Vibration (Based on IEC 60068-2-64) • 10 to 40 Hz: 0.0125 g^2/ Hz • 40 to 100 Hz: 0.0125 → 0.002 g^2 /Hz • 100 to 500 Hz: 0.002 g^2/ Hz • 500 to 2000 Hz: 0.002 → 1.3 x 10-$^4g^2$/ Hz • Test time: 1 hr for each test
EMC resistance burst/ESD	EN 61000-6-2: 2005 EN 61000-6-4/A11: 2011
Installation Pos. / Protect. Class	Variable/IP20
Product certifications	CE, FCC, RoHS, Reach, UL, KC(MSIP-REM-CV3-RT-4428)
Power Dissipation	Max. 140 mA @ 5 Vdc
Isolation	I/O to Logic: Photocoupler Isolation Field power: Non-Isolation
Field Power	Supply Voltage: 24 Vdc nominal Voltage Range: 18 to 32 Vdc
Wiring	I/O Cable Max. 2.0 mm^2 (AWG 14)
Weight	61 g
Module size	12 mm x 99 mm x 70 mm

7.41 RT-4428 LED Indicator

Table 7-34 LED Indicator

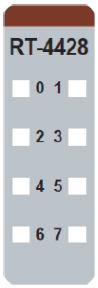
Module	LED number	LED function / description	LED colour
	0	Output Channel 0	Green
	1	Output Channel 1	
	2	Output Channel 2	
	3	Output Channel 3	
	4	Output Channel 5	
	5	Output Channel 6	
	6	Output Channel 7	
	7	Output Channel 8	

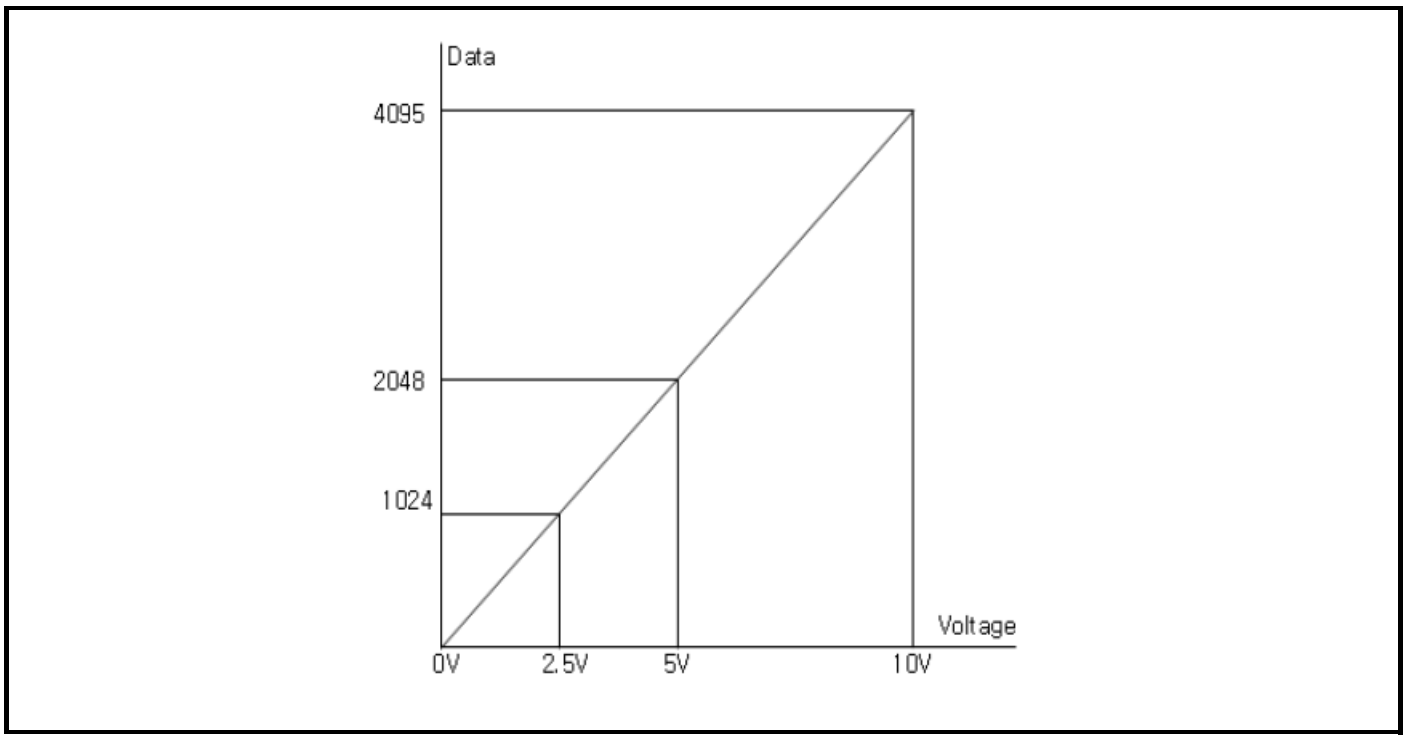
Table 7-35 Channel Status LED

Status	LED	To indicate
Normal Operation	Off	No Output Value
	Green	Normal Operation
Field Power Error	All Channel Repeat the Green and Off	Field power is unconnected

7.42 Data Value / Voltage

Table 7-36 Voltage Range: 0 to 10 Vdc

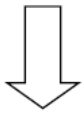
Voltage	0.0 V	2.5 V	5.0 V	10.0 V
Data (Hex)	H0000	H03FF	H07FF	H0FFF



7.43 Mapping data into the image table

- Output Image Value

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Analog Output Ch0 Low byte							
Byte 1	Analog Output Ch0 High byte							
Byte 2	Analog Output Ch1 Low byte							
Byte 3	Analog Output Ch1 High byte							
Byte 4	Analog Output Ch2 Low byte							
Byte 5	Analog Output Ch2 High byte							
Byte 6	Analog Output Ch3 Low byte							
Byte 7	Analog Output Ch3 High byte							
Byte 8	Analog Output Ch4 High byte							
Byte 9	Analog Output Ch4 High byte							
Byte 10	Analog Output Ch5 High byte							
Byte 11	Analog Output Ch5 High byte							
Byte 12	Analog Output Ch6 High byte							
Byte 13	Analog Output Ch6 High byte							
Byte 14	Analog Output Ch7 High byte							
Byte 15	Analog Output Ch7 High byte							



- Output Module Data -16 byte Output Data

Analog Output Ch0
Analog Output Ch1
Analog Output Ch2
Analog Output Ch3
Analog Output Ch4
Analog Output Ch5
Analog Output Ch6
Analog Output Ch7

7.44 Parameter data

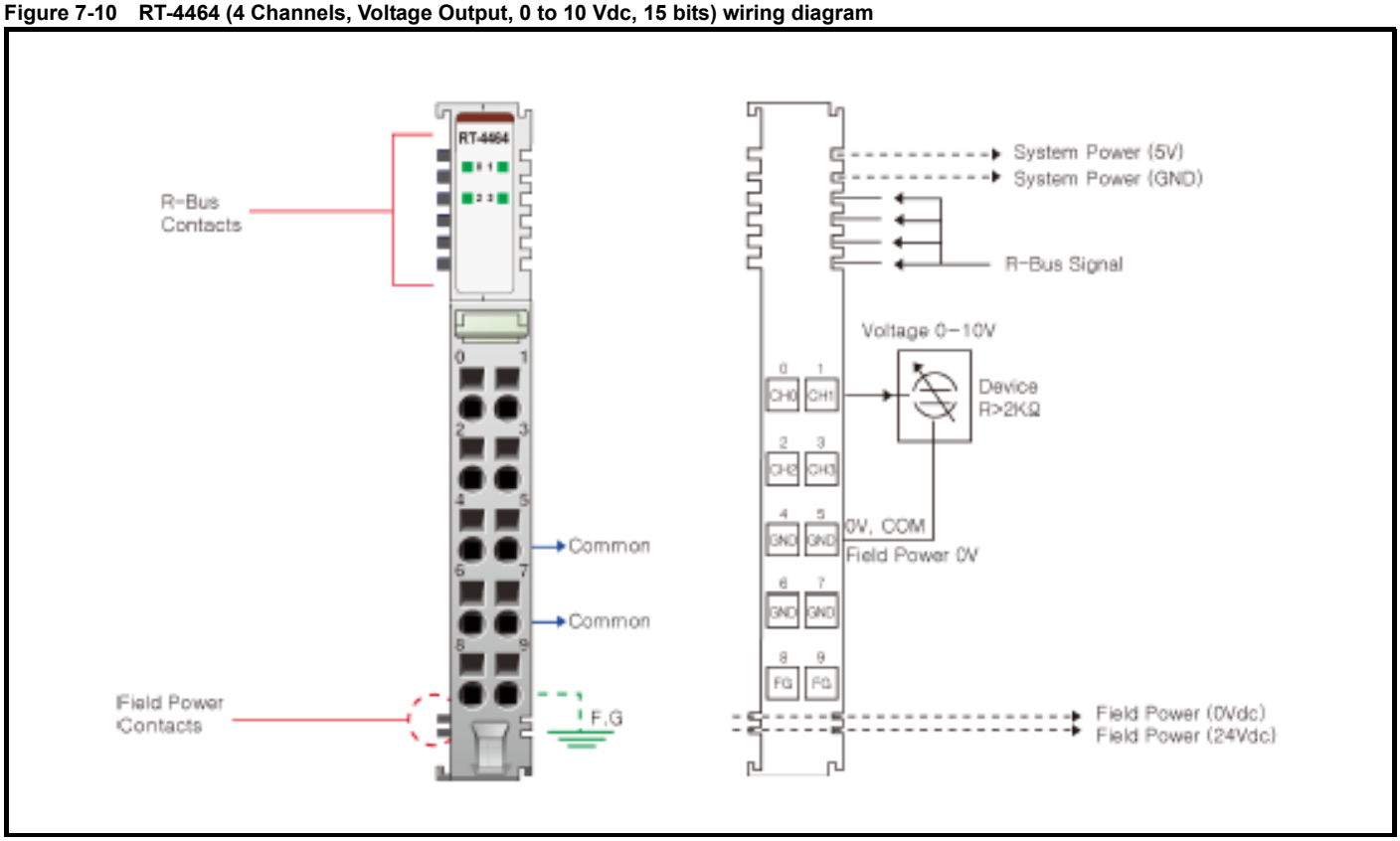
- Valid Parameter length: 4 Bytes
- Parameter data

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Fault Action for channel 3		Fault Action for channel 2		Fault Action for channel 1		Fault Action for channel 0	
	00: Fault Value 01: Hold last state 10: Low Limit 11:High Limit							
Byte 1	Fault Action for channel 7		Fault Action for channel 6		Fault Action for channel 5		Fault Action for channel 4	
Byte 2	Fault Value Low Byte							
Byte 3	Not used				Fault Value High Byte			

All values are stored in Bus Coupler`s EEPROM.

7.45 RT-4464 (4 Channels, Voltage Output, 0 to 10 Vdc, 15 bits)

Figure 7-10 RT-4464 (4 Channels, Voltage Output, 0 to 10 Vdc, 15 bits) wiring diagram



Pin number	Signal Description	Signal Description	Pin number
0	Analog Output Channel 0	Analog Output Channel 1	1
2	Analog Output Channel 2	Analog Output Channel 3	3
4	Output Channel Common (AGND)	Output Channel Common (AGND)	5
6	Output Channel Common (AGND)	Output Channel Common (AGND)	7
8	Field Ground	Field Ground	9

Table 7-37 Environmental specification

Environmental specifications	
Operating temperature	-20 °C to 60 °C
Storage temperature	-40 °C to 85 °C
Relative humidity	5 % to 90 % non-condensing
Operating altitude	2000 m
Mounting	DIN rail
Output specification	
Outputs Per Module	4 Channels Single Ended
Indicators	4 Green Output Status LEDs
Resolution in Ranges	15 bits: 0.31 mV/ bit
Output Voltage Range	0 to 10 Vdc
Data Format	16 bits Integer (2's complement)
Module Error	±0.1 % Full Scale @ 25 °C ±0.3 % Full Scale @ -25 °C, 60 °C
Load Resistance	Min. 2 kΩ
Diagnostic	Field Power Off: LED Blinking Field Power On: No Output LED Off Field Power On: Output LED ON
Conversion Time	≤0.25 ms / channel
Calibration	Not Required
Common Type	4 Channels / 4 Common
General specifications	
Shock operating	IEC 60068-2-27
Vibration resistance	Sine Vibration (Based on IEC 60068-2-6) - • 5 to 25 Hz: ± 1.6 mm • 25 to 300 Hz: 4 g • Sweep Rate: 1 Oct/min, 20 Sweeps Random Vibration (Based on IEC 60068-2-64) • 10 to 40 Hz: 0.0125 g^2/ Hz • 40 to 100 Hz: 0.0125 → 0.002 g^2 /Hz • 100 to 500 Hz: 0.002 g^2/ Hz • 500 to 2000 Hz: 0.002 → 1.3 x 10-$^4g^2$/ Hz • Test time: 1 hr for each test
EMC resistance burst/ESD	EN 61000-6-2: 2005 EN 61000-6-4/A11: 2011
Installation Pos. / Protect. Class	Variable/IP20
Product certifications	CE, FCC, RoHS, Reach, UL, KC(MSIP-REM-CV3-RT-4464)
Power Dissipation	Max. 100 mA @ 5 Vdc
Isolation	I/O to Logic: Photocoupler Isolation Field power: Non-Isolation
Field Power	Supply Voltage: 24 Vdc nominal Voltage Range: 18 to 32 Vdc
Wiring	I/O Cable Max. 2.0 mm^2 (AWG 14)
Weight	58 g
Module size	12 mm x 99 mm x 70 mm

7.46 RT-4464 LED Indicator

Table 7-38 LED Indicator

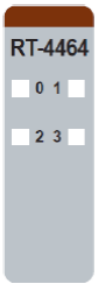
Module	LED number	LED function / description	LED colour
	0	OUTPUT Channel 0	Green
	1	OUTPUT Channel 1	
	2	OUTPUT Channel 2	
	3	OUTPUT Channel 3	

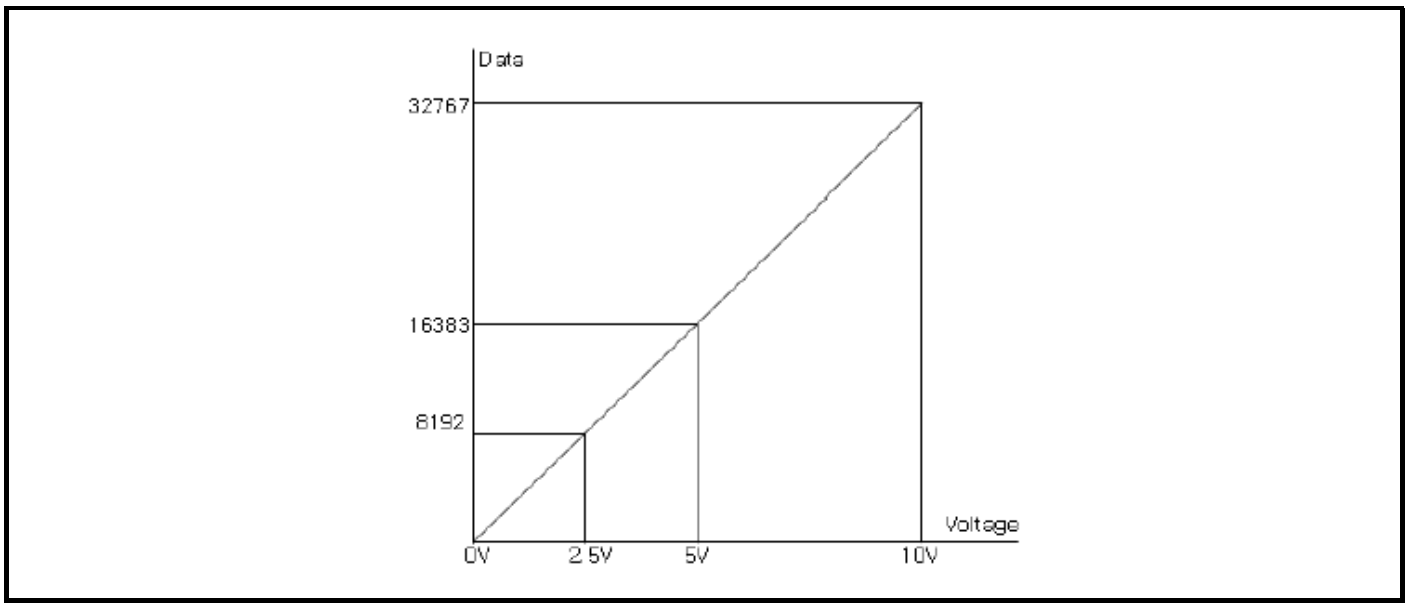
Table 7-39 Channel Status LED

Status	LED	To indicate
Normal Operation	Off	No Output Value
	Green	Normal Operation
Field Power Error	All Channel Repeat the Green and Off	Field power is unconnected

7.47 Data Value / Voltage

Table 7-40 Voltage Range: 0 to 10 Vdc

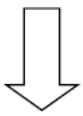
Voltage	0.0 V	2.5 V	5.0 V	10.0 V
Data (Hex)	H0000	H1FFF	H3FFF	H7FFF



7.48 Mapping data from the image table

- Output Image Value

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Analog Output Ch0 Low byte							
Byte 1	Analog Output Ch0 High byte							
Byte 2	Analog Output Ch1 Low byte							
Byte 3	Analog Output Ch1 High byte							
Byte 4	Analog Output Ch2 Low byte							
Byte 5	Analog Output Ch2 High byte							
Byte 6	Analog Output Ch3 Low byte							
Byte 7	Analog Output Ch3 High byte							



- Output Module Data -8byte Output Data

Analog Output Ch0
Analog Output Ch1
Analog Output Ch2
Analog Output

7.49 Parameter data

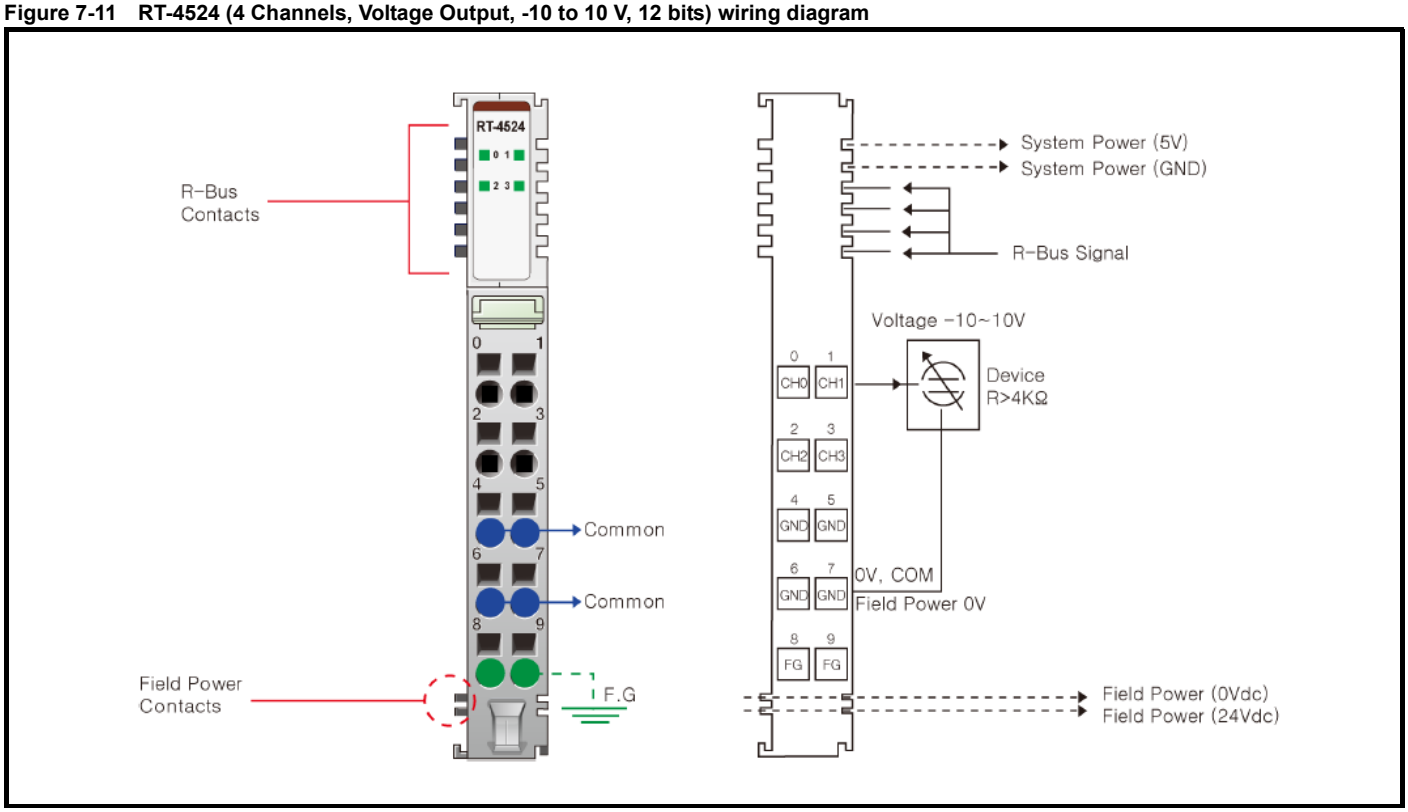
- Valid Parameter length: 4 Bytes
- Parameter data

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Fault Action for channel 3		Fault Action for channel 2		Fault Action for channel 1		Fault Action for channel 0	
	00: Fault Value 01: Hold last state 10: Low Limit 11:High Limit							
Byte 1	Not Used							
Byte 2	Fault Value Low Byte							
Byte 3	Not used				Fault Value High Byte			

All values are stored in Bus Coupler`s EEPROM.

7.50 RT-4524 (4 Channels, Voltage Output, -10 to 10 V, 12 bits)

Figure 7-11 RT-4524 (4 Channels, Voltage Output, -10 to 10 V, 12 bits) wiring diagram



Pin number	Signal Description	Signal Description	Pin number
0	Analog Output Channel 0	Analog Output Channel 1	1
2	Analog Output Channel 2	Analog Output Channel 3	3
4	Output Channel Common (AGND)	Output Channel Common (AGND)	5
6	Output Channel Common (AGND)	Output Channel Common (AGND)	7
8	Field Ground	Field Ground	9

Table 7-41 Environmental specification

Environmental specifications	
Operating temperature	-20 °C to 60 °C
Storage temperature	-40 °C to 85 °C
Relative humidity	5 % to 90 % non-condensing
Operating altitude	2000 m
Mounting	DIN rail
Output specification	
Outputs Per Module	4 Channels Single Ended
Indicators	4 Green Output Status LEDs
Resolution in Ranges	12 bits: 4.88 mV/ bit
Output Voltage Range	-10 to 10 V
Data Format	16 bits Integer (2's complement)
Module Error	±0.1 % Full Scale @ 25 °C ±0.3 % Full Scale @ -20 °C, 60 °C
Load Resistance	Min. 4 kΩ
Diagnostic	Field Power Off: LED Blinking Field Power On: No Output LED Off Field Power On: Output LED ON
Conversion Time	≤0.25 ms / channel
Calibration	Not Required
Common Type	4 Channels / 4 Common
General specifications	
Shock operating	IEC 60068-2-27
Vibration resistance	Sine Vibration (Based on IEC 60068-2-6) - • 5 to 25 Hz: ± 1.6 mm • 25 to 300 Hz: 4 g • Sweep Rate: 1 Oct/min, 20 Sweeps Random Vibration (Based on IEC 60068-2-64) • 10 to 40 Hz: 0.0125 g^2/ Hz • 40 to 100 Hz: 0.0125 → 0.002 g^2 /Hz • 100 to 500 Hz: 0.002 g^2/ Hz • 500 to 2000 Hz: 0.002 → 1.3 x 10-$^4g^2$/ Hz • Test time: 1 hr for each test
EMC resistance burst/ESD	EN 61000-6-2: 2005 EN 61000-6-4/A11: 2011
Installation Pos. / Protect. Class	Variable/IP20
Product certifications	CE, FCC, RoHS, Reach, UL, KC(MSIP-REM-CV3-RT-4524)
Power Dissipation	Max. 100 mA @ 5 Vdc
Isolation	I/O to Logic: Photocoupler Isolation Field power: Non-Isolation
Field Power	Supply Voltage: 24 Vdc nominal Voltage Range: 18 to 32 Vdc
Wiring	I/O Cable Max. 2.0 mm^2 (AWG 14)
Weight	59 g
Module size	12 mm x 99 mm x 70 mm

7.51 RT-4524 LED Indicator

Table 7-42 LED Indicator

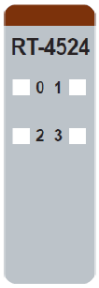
Module	LED number	LED function / description	LED colour
	0	OUTPUT Channel 0	Green
	1	OUTPUT Channel 1	
	2	OUTPUT Channel 2	
	3	OUTPUT Channel 3	

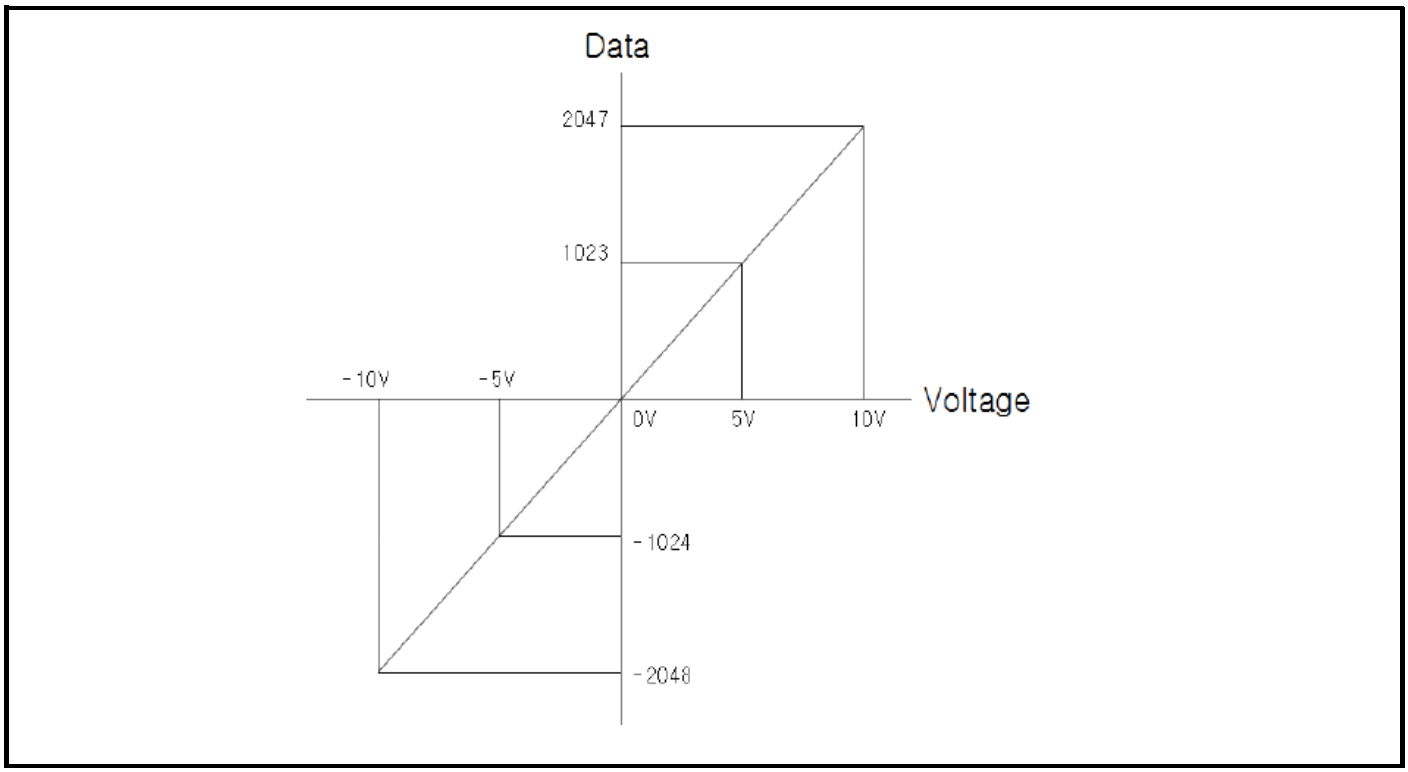
Table 7-43 Channel Status LED

Status	LED	To indicate
Normal Operation	Off	No Output Value
	Green	Normal Operation
Field Power Error	All Channel Repeat the Green and Off	Field power is unconnected

7.52 Data Value / Voltage

Table 7-44 Voltage Range: 0 to 10 Vdc

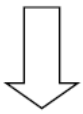
Voltage	-10 V	-5.0 V	5.0 V	10.0 V
Data (Hex)	HF800	HFC00	H03FF	H07FF



7.53 Mapping data from the image table

- Output Image Value

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Analog Output Ch0 Low byte							
Byte 1	Analog Output Ch0 High byte							
Byte 2	Analog Output Ch1 Low byte							
Byte 3	Analog Output Ch1 High byte							
Byte 4	Analog Output Ch2 Low byte							
Byte 5	Analog Output Ch2 High byte							
Byte 6	Analog Output Ch3 Low byte							
Byte 7	Analog Output Ch3 High byte							



- Output Module Data -8 byte Output Data

Analog Output Ch0
Analog Output Ch1
Analog Output Ch2
Analog Output Ch3

7.54 Parameter data

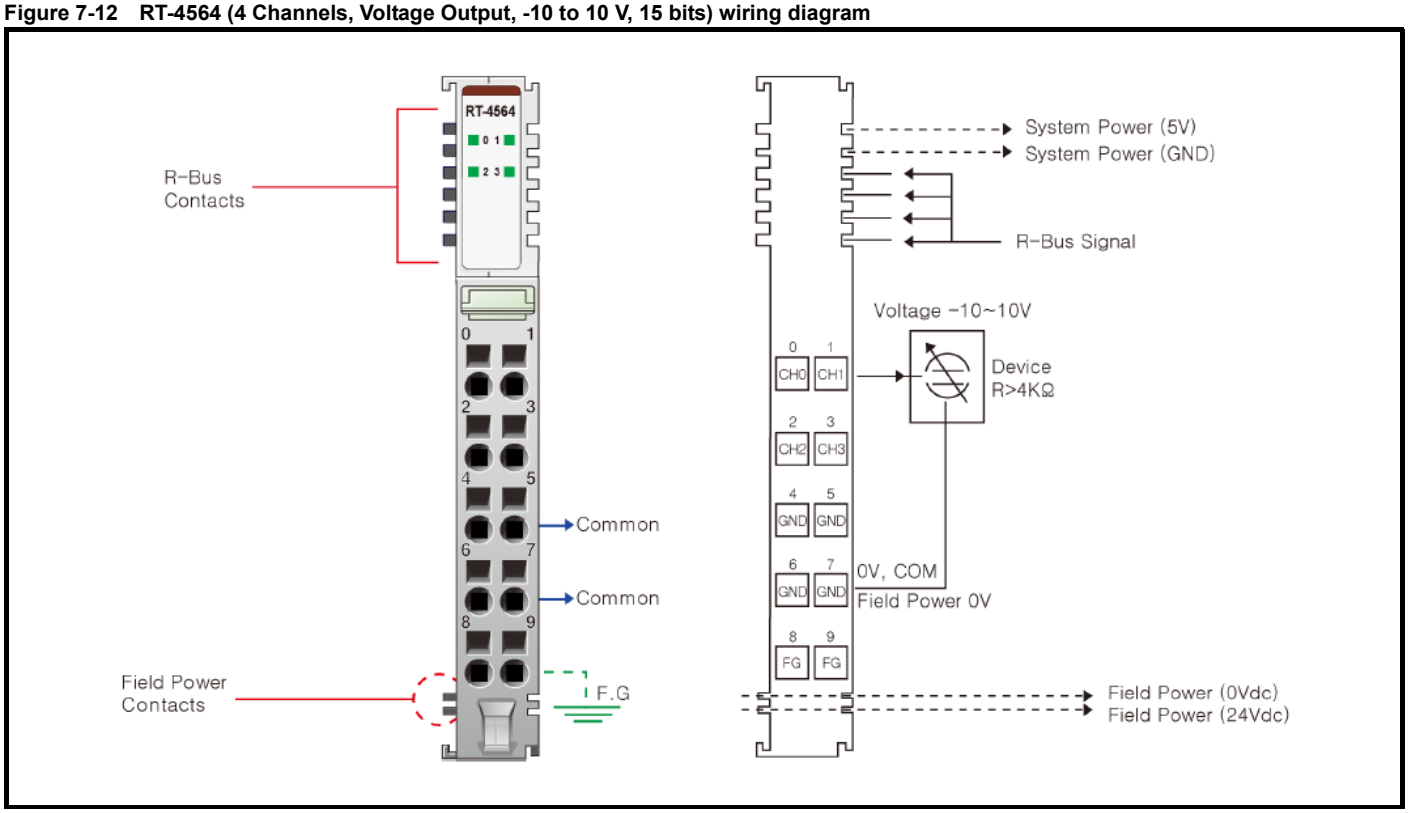
- Valid Parameter length: 4 Bytes
- Parameter data

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Fault Action for channel 3		Fault Action for channel 2		Fault Action for channel 1		Fault Action for channel 0	
	00: Fault Value 01: Hold last state 10: Low Limit 11:High Limit							
Byte 1	Not Used							
Byte 2	Fault Value Low Byte							
Byte 3	Not used				Fault Value High Byte			

All values are stored in Bus Coupler`s EEPROM.

7.55 RT-4564 (4 Channels, Voltage Output, -10 to 10 V, 15 bits)

Figure 7-12 RT-4564 (4 Channels, Voltage Output, -10 to 10 V, 15 bits) wiring diagram



Pin number	Signal Description	Signal Description	Pin number
0	Analog Output Channel 0	Analog Output Channel 1	1
2	Analog Output Channel 2	Analog Output Channel 3	3
4	Output Channel Common (AGND)	Output Channel Common (AGND)	5
6	Output Channel Common (AGND)	Output Channel Common (AGND)	7
8	Field Ground	Field Ground	9

Table 7-45 Environmental specification

Environmental specifications	
Operating temperature	-20 °C to 60 °C
Storage temperature	-40 °C to 85 °C
Relative humidity	5 % to 90 % non-condensing
Operating altitude	2000 m
Mounting	DIN rail
Output specification	
Outputs Per Module	4 Channels Single Ended
Indicators	4 Green Output Status LEDs
Resolution in Ranges	15 bits: 0.61 mV/ bit
Output Voltage Range	-10 to 10 V
Data Format	16 bits Integer (2's complement)
Module Error	±0.1 % Full Scale @ 25 °C ±0.3 % Full Scale @ -25 °C, 60 °C
Load Resistance	Min. 4 kΩ
Diagnostic	Field Power Off: LED Blinking Field Power On: No Output LED Off Field Power On: Output LED ON
Conversion Time	≤0.25 ms / channel
Calibration	Not Required
Common Type	4 Channels / 4 Common
General specifications	
Shock operating	IEC 60068-2-27
Vibration resistance	Sine Vibration (Based on IEC 60068-2-6) - • 5 to 25 Hz: ± 1.6 mm • 25 to 300 Hz: 4 g • Sweep Rate: 1 Oct/min, 20 Sweeps Random Vibration (Based on IEC 60068-2-64) • 10 to 40 Hz: 0.0125 g^2/ Hz • 40 to 100 Hz: 0.0125 → 0.002 g^2 /Hz • 100 to 500 Hz: 0.002 g^2/ Hz • 500 to 2000 Hz: 0.002 → 1.3 x $10^{-4}g^2$/ Hz • Test time: 1 hr for each test
EMC resistance burst/ESD	EN 61000-6-2: 2005 EN 61000-6-4/A11: 2011
Installation Pos. / Protect. Class	Variable/IP20
Product certifications	CE, FCC, RoHS, Reach, UL, KC(MSIP-REM-CV3-RT-4564)
Power Dissipation	Max. 100 mA @ 5 Vdc
Isolation	I/O to Logic: Photocoupler Isolation Field power: Non-Isolation
Field Power	Supply Voltage: 24 Vdc nominal Voltage Range: 18 to 32 Vdc
Wiring	I/O Cable Max. 2.0 mm^2 (AWG 14)
Weight	59 g
Module size	12 mm x 99 mm x 70 mm

7.56 RT-4564 LED Indicator

Table 7-46 LED Indicator

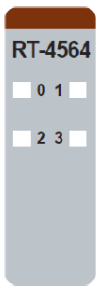
Module	LED number	LED function / description	LED colour
	0	OUTPUT Channel 0	Green
	1	OUTPUT Channel 1	
	2	OUTPUT Channel 2	
	3	OUTPUT Channel 3	

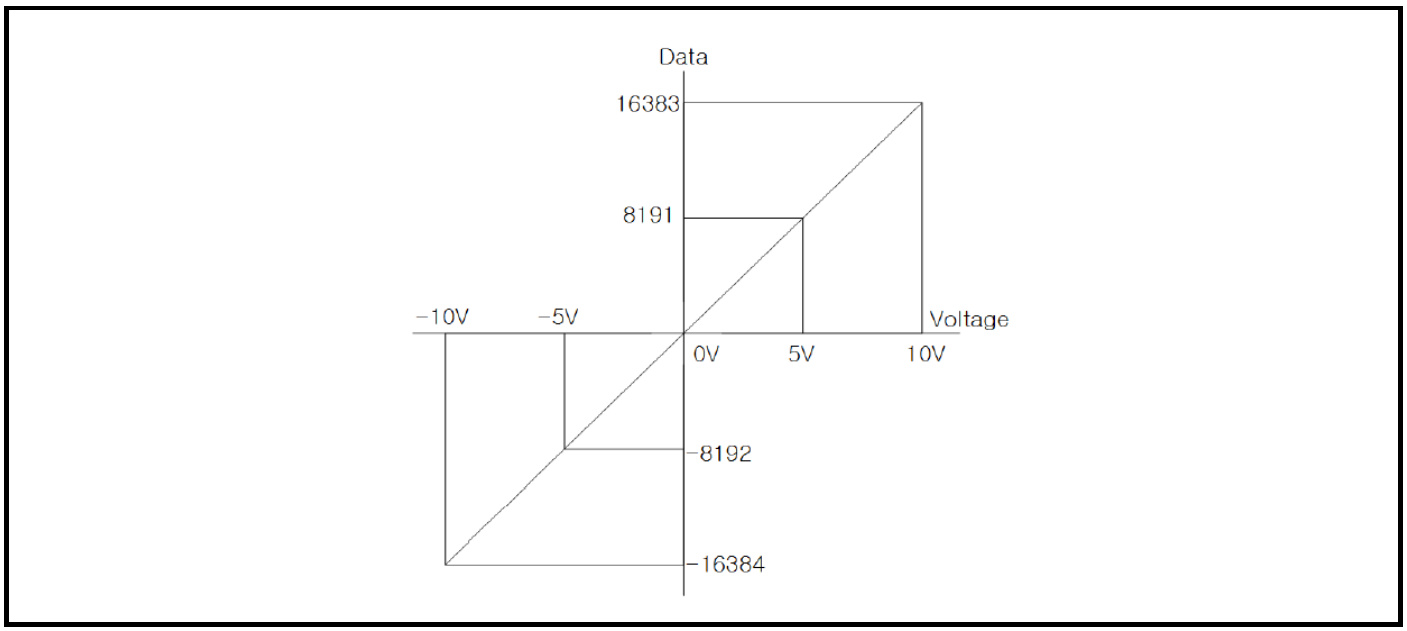
Table 7-47 Channel Status LED

Status	LED	To indicate
Normal Operation	Off	No Output Value
	Green	Normal Operation
Field Power Error	All Channel Repeat the Green and Off	Field power is unconnected

7.57 Data Value / Voltage

Table 7-48 Voltage Range: 0 to 10 Vdc

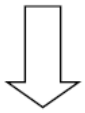
Voltage	-10 V	-5.0 V	5.0 V	10.0 V
Data (Hex)	HC000	HE000	H1FFF	H3FFF



7.58 Mapping data from the image table

- Output Image Value

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Analog Output Ch0 Low byte							
Byte 1	Analog Output Ch0 High byte							
Byte 2	Analog Output Ch1 Low byte							
Byte 3	Analog Output Ch1 High byte							
Byte 4	Analog Output Ch2 Low byte							
Byte 5	Analog Output Ch2 High byte							
Byte 6	Analog Output Ch3 Low byte							
Byte 7	Analog Output Ch3 High byte							



- Output Module Data -8byte Output Data

Analog Output Ch0
Analog Output Ch1
Analog Output Ch2
Analog Output Ch3

7.59 Parameter data

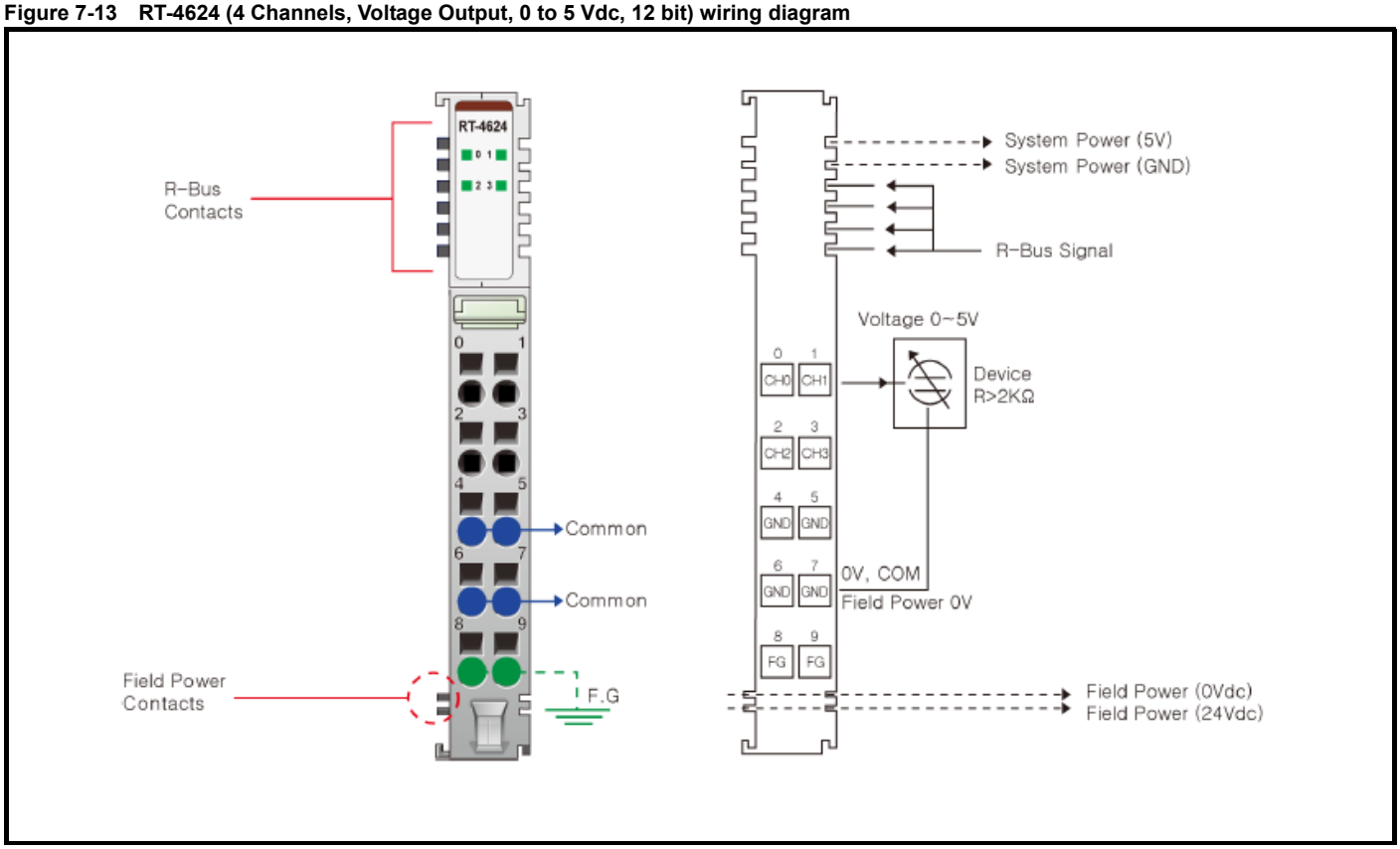
- Valid Parameter length: 4 Bytes
- Parameter data

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Fault Action for channel 3		Fault Action for channel 2		Fault Action for channel 1		Fault Action for channel 0	
	00: Fault Value 01: Hold last state 10: Low Limit 11:High Limit							
Byte 1	Not Used							
Byte 2	Fault Value Low Byte							
Byte 3	Not used				Fault Value High Byte			

All values are stored in Bus Coupler`s EEPROM.

7.60 RT-4624 (4 Channels, Voltage Output, 0 to 5 Vdc, 12 bit)

Figure 7-13 RT-4624 (4 Channels, Voltage Output, 0 to 5 Vdc, 12 bit) wiring diagram



Pin number	Signal Description	Signal Description	Pin number
0	Analog Output Channel 0	Analog Output Channel 1	1
2	Analog Output Channel 2	Analog Output Channel 3	3
4	Output Channel Common (AGND)	Output Channel Common (AGND)	5
6	Output Channel Common (AGND)	Output Channel Common (AGND)	7
8	Field Ground	Field Ground	9

Table 7-49 Environmental specification

Environmental specifications	
Operating temperature	-20 °C to 60 °C
Storage temperature	-40 °C to 85 °C
Relative humidity	5 % to 90 % non-condensing
Operating altitude	2000 m
Mounting	DIN rail
Output specification	
Outputs Per Module	4 Channels Single Ended
Indicators	4 Green Output Status LEDs
Resolution in Ranges	12 bits: 1.22 mV/ bit
Output Voltage Range	0 to 5 Vdc
Data Format	16 bits Integer (2's complement)
Module Error	±0.1 % Full Scale @ 25 °C ±0.3 % Full Scale @ -20 °C, 60 °C
Load Resistance	Min. 2 kΩ
Diagnostic	Field Power Off: LED Blinking Field Power On: No Output LED Off Field Power On: Output LED ON
Conversion Time	≤0.25 ms / channel
Calibration	Not Required
Common Type	4 Channels / 4 Common
General specifications	
Shock operating	IEC 60068-2-27
Vibration resistance	Sine Vibration (Based on IEC 60068-2-6) • 5 to 25 Hz: ± 1.6 mm • 25 to 300 Hz: 4 g • Sweep Rate: 1 Oct/min, 20 Sweeps Random Vibration (Based on IEC 60068-2-64) • 10 to 40 Hz: 0.0125 g^2/ Hz • 40 to 100 Hz: 0.0125 → 0.002 g^2 /Hz • 100 to 500 Hz: 0.002 g^2/ Hz • 500 to 2000 Hz: 0.002 → 1.3 x 10-$^4g^2$/ Hz • Test time: 1 hr for each test
EMC resistance burst/ESD	EN 61000-6-2: 2005 EN 61000-6-4/A11: 2011
Installation Pos. / Protect. Class	Variable/IP20
Product certifications	CE, FCC, RoHS, Reach, UL, KC(MSIP-REM-CV3-RT-4624)
Power Dissipation	Max. 100 mA @ 5 Vdc
Isolation	I/O to Logic: Photocoupler Isolation Field power: Non-Isolation
Field Power	Supply Voltage: 24 Vdc nominal Voltage Range: 18 to 32 Vdc
Wiring	I/O Cable Max. 2.0 mm^2 (AWG 14)
Weight	58 g
Module size	12 mm x 99 mm x 70 mm

7.61 RT-4624 LED Indicator

Table 7-50 LED Indicator

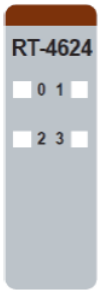
Module	LED number	LED function / description	LED colour
	0	OUTPUT Channel 0	Green
	1	OUTPUT Channel 1	
	2	OUTPUT Channel 2	
	3	OUTPUT Channel 3	

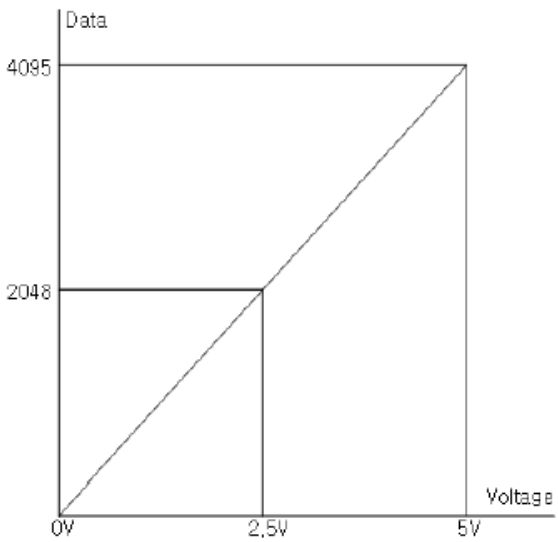
Table 7-51 Channel Status LED

Status	LED	To indicate
Normal Operation	Off	No Output Value
	Green	Normal Operation
Field Power Error	All Channel Repeat the Green and Off	Field power is unconnected

7.62 Data Value / Voltage

Table 7-52 Voltage Range: 0 to 5 Vdc

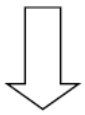
Voltage	0.0 V	2.5 V	5.0 V
Data (Hex)	H0000	H0800	H0FFF



7.63 Mapping data from the image table

- Output Image Value

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Analog Output Ch0 Low byte							
Byte 1	Analog Output Ch0 High byte							
Byte 2	Analog Output Ch1 Low byte							
Byte 3	Analog Output Ch1 High byte							
Byte 4	Analog Output Ch2 Low byte							
Byte 5	Analog Output Ch2 High byte							
Byte 6	Analog Output Ch3 Low byte							
Byte 7	Analog Output Ch3 High byte							



- Output Module Data -8 byte Output Data

Analog Output Ch0
Analog Output Ch1
Analog Output Ch2
Analog Output Ch3

7.64 Parameter data

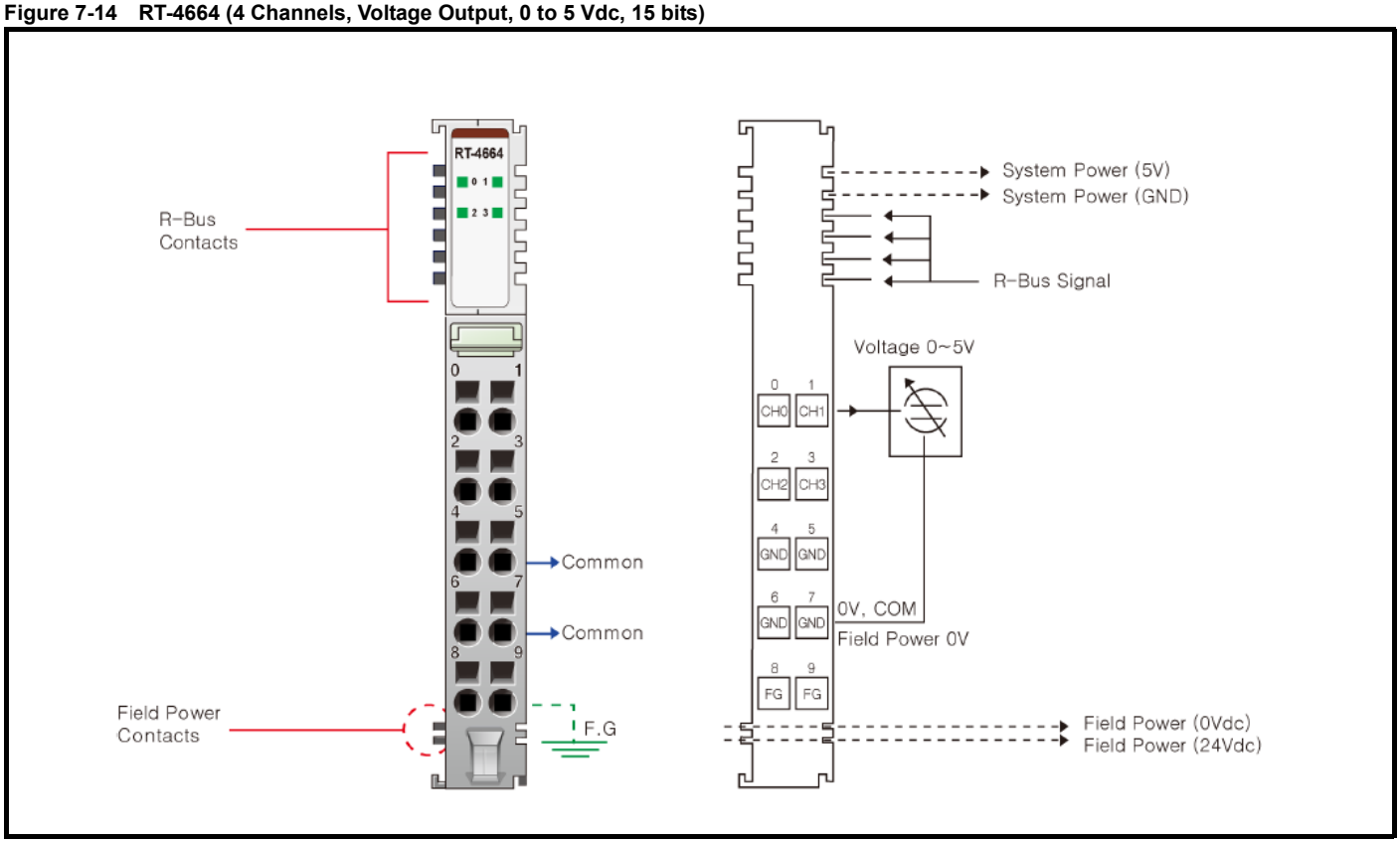
- Valid Parameter length: 4 Bytes
- Parameter data

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Fault Action for channel 3		Fault Action for channel 2		Fault Action for channel 1		Fault Action for channel 0	
	00: Fault Value 01: Hold last state 10: Low Limit 11:High Limit							
Byte 1	Not Used							
Byte 2	Fault Value Low Byte							
Byte 3	Not used				Fault Value High Byte			

All values are stored in Bus Coupler`s EEPROM.

7.65 RT-4664 (4 Channels, Voltage Output, 0 to 5 Vdc, 15 bits)

Figure 7-14 RT-4664 (4 Channels, Voltage Output, 0 to 5 Vdc, 15 bits)



Pin number	Signal Description	Signal Description	Pin number
0	Analog Output Channel 0	Analog Output Channel 1	1
2	Analog Output Channel 2	Analog Output Channel 3	3
4	Output Channel Common (AGND)	Output Channel Common (AGND)	5
6	Output Channel Common (AGND)	Output Channel Common (AGND)	7
8	Field Ground	Field Ground	9

Table 7-53 Environmental specification

Environmental specifications	
Operating temperature	-20 °C to 60 °C
Storage temperature	-40 °C to 85 °C
Relative humidity	5 % to 90 % non-condensing
Operating altitude	2000 m
Mounting	DIN rail
Output specification	
Outputs Per Module	4 Channels Single Ended
Indicators	4 Green Output Status LEDs
Resolution in Ranges	15 bits: 0.15 mV/ bit
Output Voltage Range	0 to 5 Vdc
Data Format	16 bits Integer (2's complement)
Module Error	±0.1 % Full Scale @ 25 °C ±0.3 % Full Scale @ -20 °C, 60 °C
Load Resistance	Min. 2 kΩ
Diagnostic	Field Power Off: LED Blinking Field Power On: No Output LED Off Field Power On: Output LED ON
Conversion Time	≤0.25 ms / channel
Calibration	Not Required
Common Type	4 Channels / 4 Common
General specifications	
Shock operating	IEC 60068-2-27
Vibration resistance	Sine Vibration (Based on IEC 60068-2-6) • 5 to 25 Hz: ± 1.6 mm • 25 to 300 Hz: 4 g • Sweep Rate: 1 Oct/min, 20 Sweeps Random Vibration (Based on IEC 60068-2-64) • 10 to 40 Hz: 0.0125 g^2/ Hz • 40 to 100 Hz: 0.0125 → 0.002 g^2 /Hz • 100 to 500 Hz: 0.002 g^2/ Hz • 500 to 2000 Hz: 0.002 → 1.3 x 10-$^4g^2$/ Hz • Test time: 1 hr for each test
EMC resistance burst/ESD	EN 61000-6-2: 2005 EN 61000-6-4/A11: 2011
Installation Pos. / Protect. Class	Variable/IP20
Product certifications	CE, FCC, RoHS, Reach, UL, KC(MSIP-REM-CV3-RT-4664)
Power Dissipation	Max. 100 mA @ 5 Vdc
Isolation	I/O to Logic: Photocoupler Isolation Field power: Non-Isolation
Field Power	Supply Voltage: 24 Vdc nominal Voltage Range: 18 to 32 Vdc
Wiring	I/O Cable Max. 2.0 mm^2 (AWG 14)
Weight	58 g
Module size	12 mm x 99 mm x 70 mm

7.66 RT-4664 LED Indicator

Table 7-54 LED Indicator

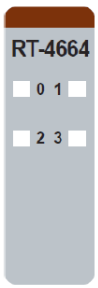
Module	LED number	LED function / description	LED colour
	0	OUTPUT Channel 0	Green
	1	OUTPUT Channel 1	
	2	OUTPUT Channel 2	
	3	OUTPUT Channel 3	

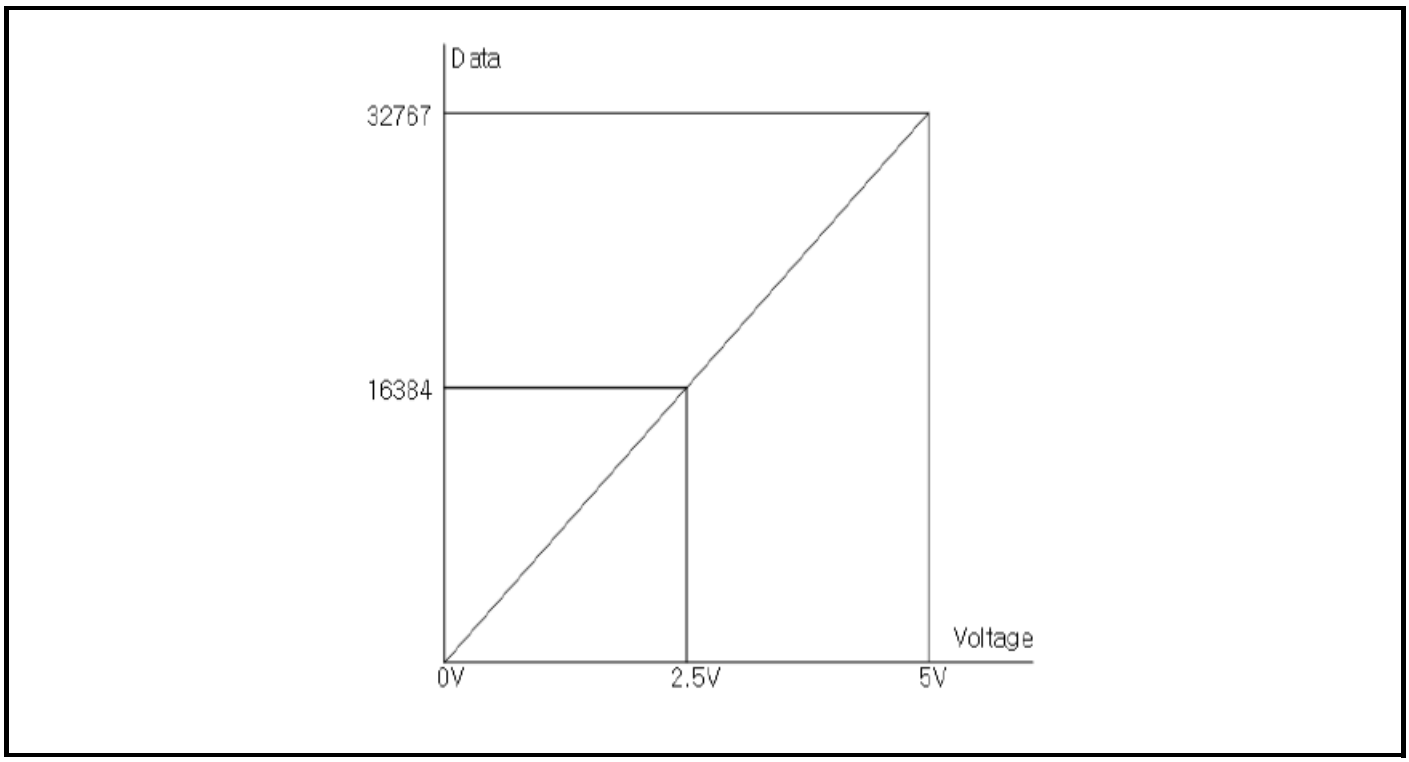
Table 7-55 Channel Status LED

Status	LED	To indicate
Normal Operation	Off	No Output Value
	Green	Normal Operation
Field Power Error	All Channel Repeat the Green and Off	Field power is unconnected

7.67 Data Value / Voltage

Table 7-56 Voltage Range: 0 to 5 Vdc

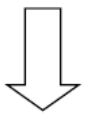
Voltage	0.0 V	2.5 V	5.0 V
Data (Hex)	H0000	H4000	H7FFF



7.68 Mapping data from the image table

- Output Image Value

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Analog Output Ch0 Low byte							
Byte 1	Analog Output Ch0 High byte							
Byte 2	Analog Output Ch1 Low byte							
Byte 3	Analog Output Ch1 High byte							
Byte 4	Analog Output Ch2 Low byte							
Byte 5	Analog Output Ch2 High byte							
Byte 6	Analog Output Ch3 Low byte							
Byte 7	Analog Output Ch3 High byte							



- Output Module Data -8 byte Output Data

Analog Output Ch0
Analog Output Ch1
Analog Output Ch2
Analog Output Ch3

7.69 Parameter data

- Valid Parameter length: 4 Bytes
- Parameter data

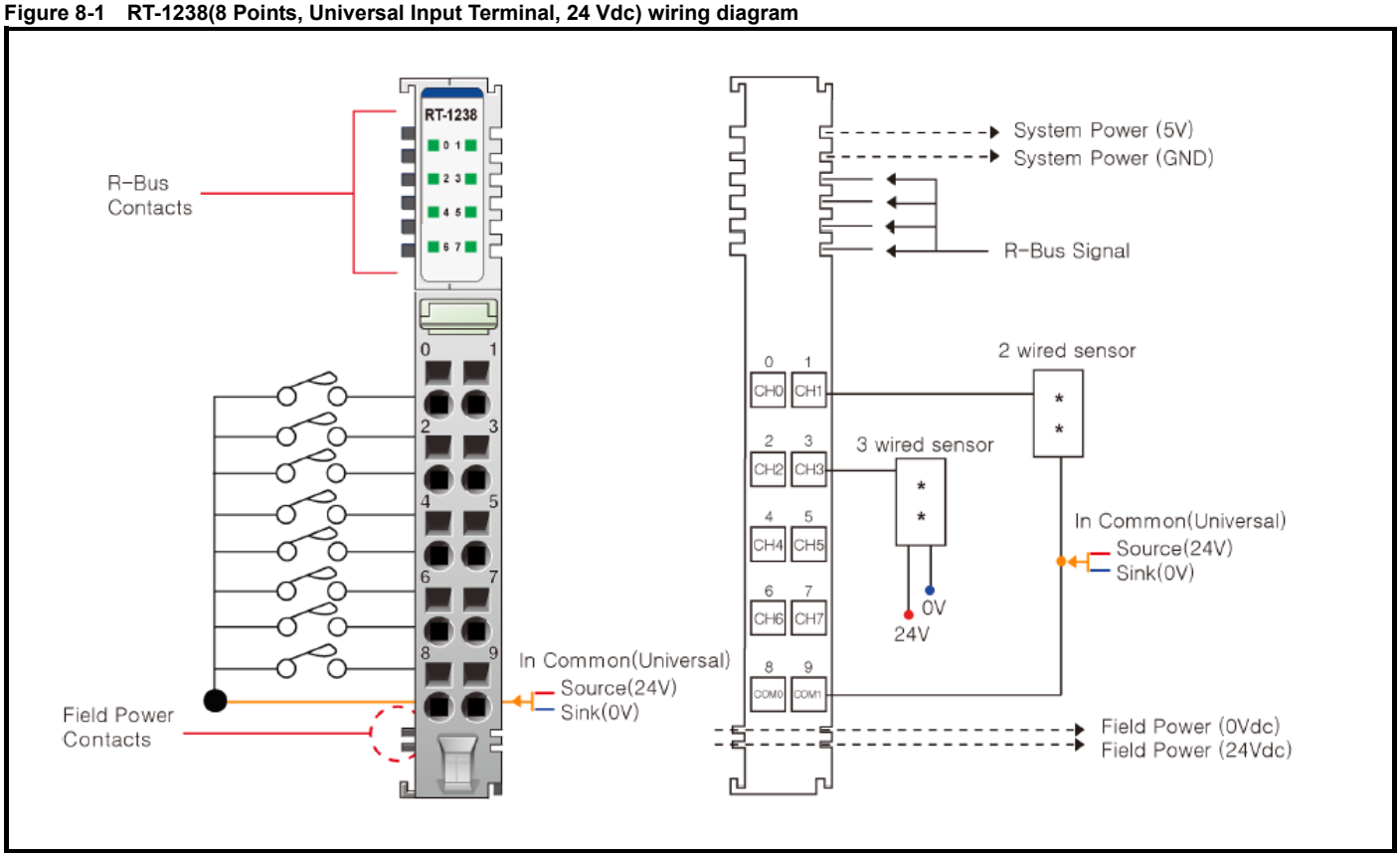
Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Fault Action for channel 3		Fault Action for channel 2		Fault Action for channel 1		Fault Action for channel 0	
	00: Fault Value 01: Hold last state 10: Low Limit 11:High Limit							
Byte 1	Not Used							
Byte 2	Fault Value Low Byte							
Byte 3	Not used				Fault Value High Byte			

All values are stored in Bus Coupler`s EEPROM.

8 Digital Input

8.1 RT-1238(8 Points, Universal Input Terminal, 24 Vdc)

Figure 8-1 RT-1238(8 Points, Universal Input Terminal, 24 Vdc) wiring diagram



Pin number	Signal description	Signal description	Pin number
0	Input Channel 0	Input Channel 1	1
2	Input Channel 2	Input Channel 3	3
4	Input Channel 4	Input Channel 5	5
6	Input Channel 6	Input Channel 7	7
8	Common (Sink Oper.0V /Source Oper.24 V)		9

Table 8-1 Environmental specification

Environmental specifications	
Operating temperature	-20 °C to 60 °C
Storage temperature	-40 °C to 85 °C
Relative humidity	5 % to 90 % non-condensing
Operating altitude	2000 m
Mounting	DIN rail
Input specification	
Inputs Per Module	8 Points Universal Type
Indicators	8 Green Input Status LEDs
ON–state Voltage	24 Vdc (Min. 13 Vdc to Max. 32 Vdc)
ON-state Current	Max. 6.4 mA / point @ 32 Vdc
Field Power OFF-state voltage	7.3 Vdc @ 25 °C
Input Signal Delay	OFF to ON: Max. 0.3 ms ON to OFF: Max. 0.3 ms
Nominal Input Impedance	5.1 kΩ typical
Common Type	8 Points / 2 Common
General specifications	
Shock operating	IEC 60068-2-27
Vibration resistance	Sine Vibration (Based on IEC 60068-2-6) - • 5 to 25 Hz: ± 1.6 mm • 25 to 300 Hz: 4 g • Sweep Rate: 1 Oct/min, 20 Sweeps Random Vibration (Based on IEC 60068-2-64) • 10 to 40 Hz: 0.0125 g^2/ Hz • 40 to 100 Hz: 0.0125 → 0.002 g^2 /Hz • 100 to 500 Hz: 0.002 g^2/ Hz • 500 to 2000 Hz: 0.002 → 1.3 x 10-$^4g^2$/ Hz • Test time: 1 hr for each test
EMC resistance burst/ESD	EN 61000-6-2: 2005 EN 61000-6-4/A11: 2011
Installation Pos. / Protect. Class	Variable/IP20
Product certifications	CE, FCC, RoHS, Reach, UL, KC(MSIP-REM-CV3-RT-1238)
Power Dissipation	Max. 90 mA @ 5 Vdc
Isolation	I/O to Logic: Photocoupler Isolation
Field Power	Supply Voltage: 24 Vdc nominal Voltage Range: 13 to 32 Vdc
Wiring	I/O Cable Max. 2.0 mm^2 (AWG 14)
Weight	58 g
Module size	12 mm x 99 mm x 70 mm

8.2 RT-1238 LED Indicator

Table 8-2 LED Indicator

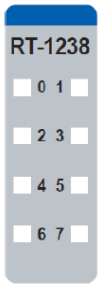
Module	LED number	LED function / description	LED colour
	0	INPUT Channel 0	Green
	1	INPUT Channel 1	
	2	INPUT Channel 2	
	3	INPUT Channel 3	
	4	INPUT Channel 4	
	5	INPUT Channel 5	
	6	INPUT Channel 6	
	7	INPUT Channel 7	

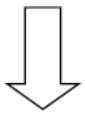
Table 8-3 Channel Status LED

Status	LED	To indicate
Off Signal	Off	No Input Signal
On Signal	Green	Normal Operation

8.3 Mapping data into the image table

- Input module data

D7	D6	D5	D4	D3	D2	D1	D0

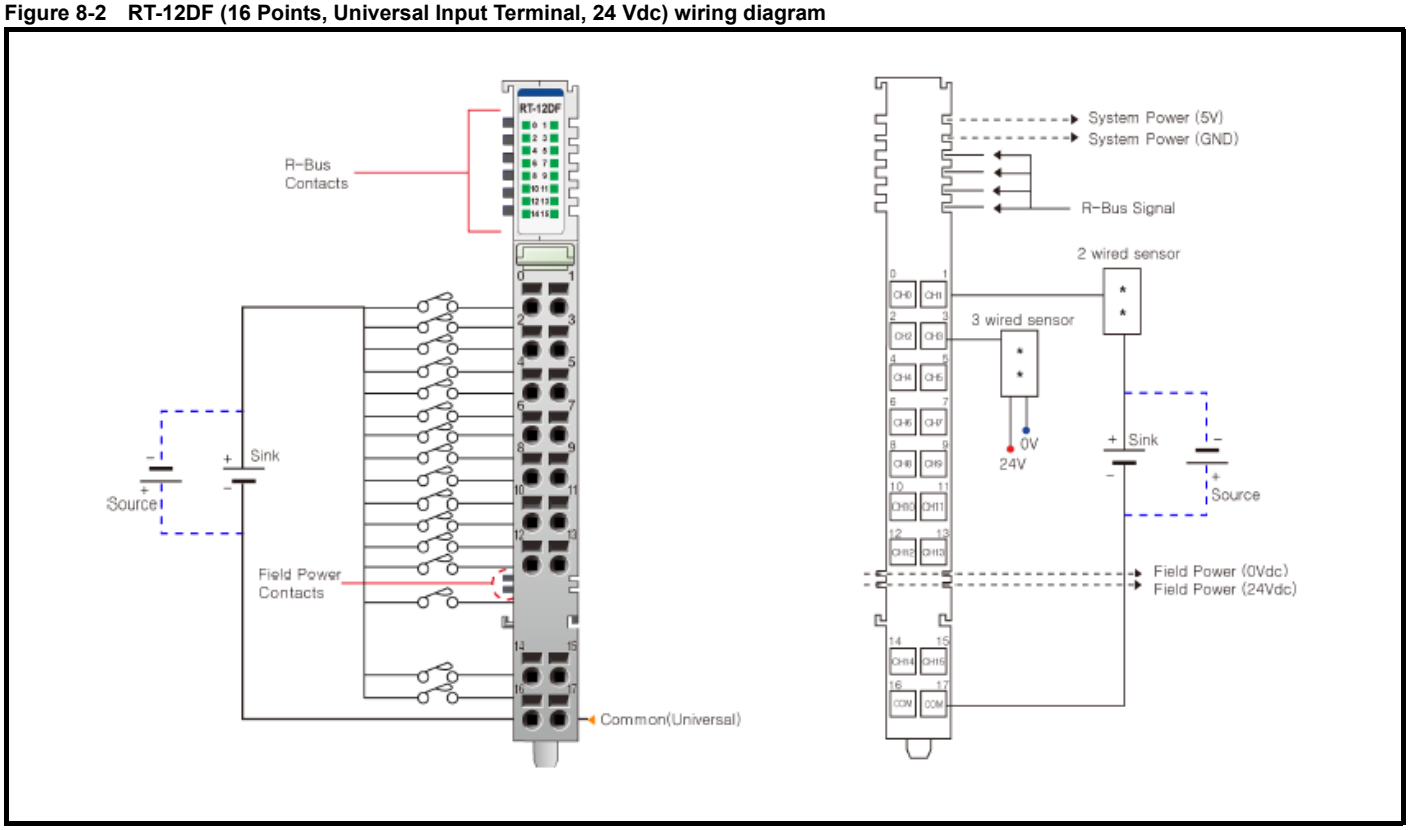


- Input image value

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	D7	D6	D5	D4	D3	D2	D1	D0

8.4 RT-12DF(16 Points, Universal Input Terminal, 24 Vdc)

Figure 8-2 RT-12DF (16 Points, Universal Input Terminal, 24 Vdc) wiring diagram



Pin number	Signal description	Signal description	Pin number
0	Input Channel 0	Input Channel 1	1
2	Input Channel 2	Input Channel 3	3
4	Input Channel 4	Input Channel 5	5
6	Input Channel 6	Input Channel 7	7
8	Input Channel 8	Input Channel 9	9
10	Input Channel 10	Input Channel 11	11
12	Input Channel 12	Input Channel 13	13
14	Input Channel 14	Input Channel 15	15
16	Common (Sink Oper.0V /Source Oper.24 V)		17

* Although the image above is RT-(Universal input module), it does not matter to refer to wiring diagram. Refer to the Sink (0V).

Table 8-4 Environmental specification

Environmental specifications	
Operating temperature	-20 °C to 60 °C
Storage temperature	-40 °C to 85 °C
Relative humidity	5 % to 90 % non-condensing
Operating altitude	2000 m
Mounting	DIN rail
Input specification	
Inputs Per Module	16 Points Universal Type
Indicators	16 Green Input Status LEDs
ON–state Voltage	24 Vdc (Min. 13 Vdc to Max. 32 Vdc)
ON-state Current	Max. 6.4 mA / point @ 32 Vdc
Field Power OFF-state voltage	7.3 Vdc @ 25 °C
Input Signal Delay	OFF to ON: Max. 0.3 ms ON to OFF: Max. 0.3 ms
Nominal Input Impedance	5.1 kΩ typical
Common Type	16 Points / 2 Common
General specifications	
Shock operating	IEC 60068-2-27
Vibration resistance	Sine Vibration (Based on IEC 60068-2-6) - • 5 to 25 Hz: ± 1.6 mm • 25 to 300 Hz: 4 g • Sweep Rate: 1 Oct/min, 20 Sweeps Random Vibration (Based on IEC 60068-2-64) • 10 to 40 Hz: 0.0125 g^2/ Hz • 40 to 100 Hz: 0.0125 → 0.002 g^2 /Hz • 100 to 500 Hz: 0.002 g^2/ Hz • 500 to 2000 Hz: 0.002 → 1.3 x $10^{-4}g^2$/ Hz • Test time: 1 hr for each test
EMC resistance burst/ESD	EN 61000-6-2: 2005 EN 61000-6-4/A11: 2011
Installation Pos. / Protect. Class	Variable/IP20
Product certifications	CE, FCC, RoHS, Reach, UL, KC(MSIP-REM-CV3-RT-12DF)
Power Dissipation	Max. 90 mA @ 5 Vdc
Isolation	I/O to Logic: Photocoupler Isolation
Field Power	Supply Voltage: 24 Vdc nominal Voltage Range: 13 to 32 Vdc
Wiring	I/O Cable Max. 1.0 mm^2 (AWG 18)
Weight	68 g
Module size	12 mm x 120 mm x 70 mm

8.5 RT-12DF LED Indicator

Table 8-5 LED Indicator

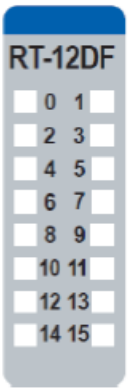
Module	LED number	LED function / description	LED colour
	0	INPUT Channel 0	Green
	1	INPUT Channel 1	
	2	INPUT Channel 2	
	3	INPUT Channel 3	
	4	INPUT Channel 4	
	5	INPUT Channel 5	
	6	INPUT Channel 6	
	7	INPUT Channel 7	
	8	INPUT Channel 8	
	9	INPUT Channel 9	
	10	INPUT Channel 10	
	11	INPUT Channel 11	
	12	INPUT Channel 12	
	13	INPUT Channel 13	
	14	INPUT Channel 14	
	15	INPUT Channel 15	

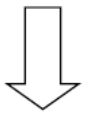
Table 8-6 Channel Status LED

Status	LED	To indicate
Off Signal	Off	No Input Signal
On Signal	Green	Normal Operation

8.6 Mapping data into the image table

- Input module data

D7	D6	D5	D4	D3	D2	D1	D0
D15	D14	D13	D12	D11	D10	D9	D8



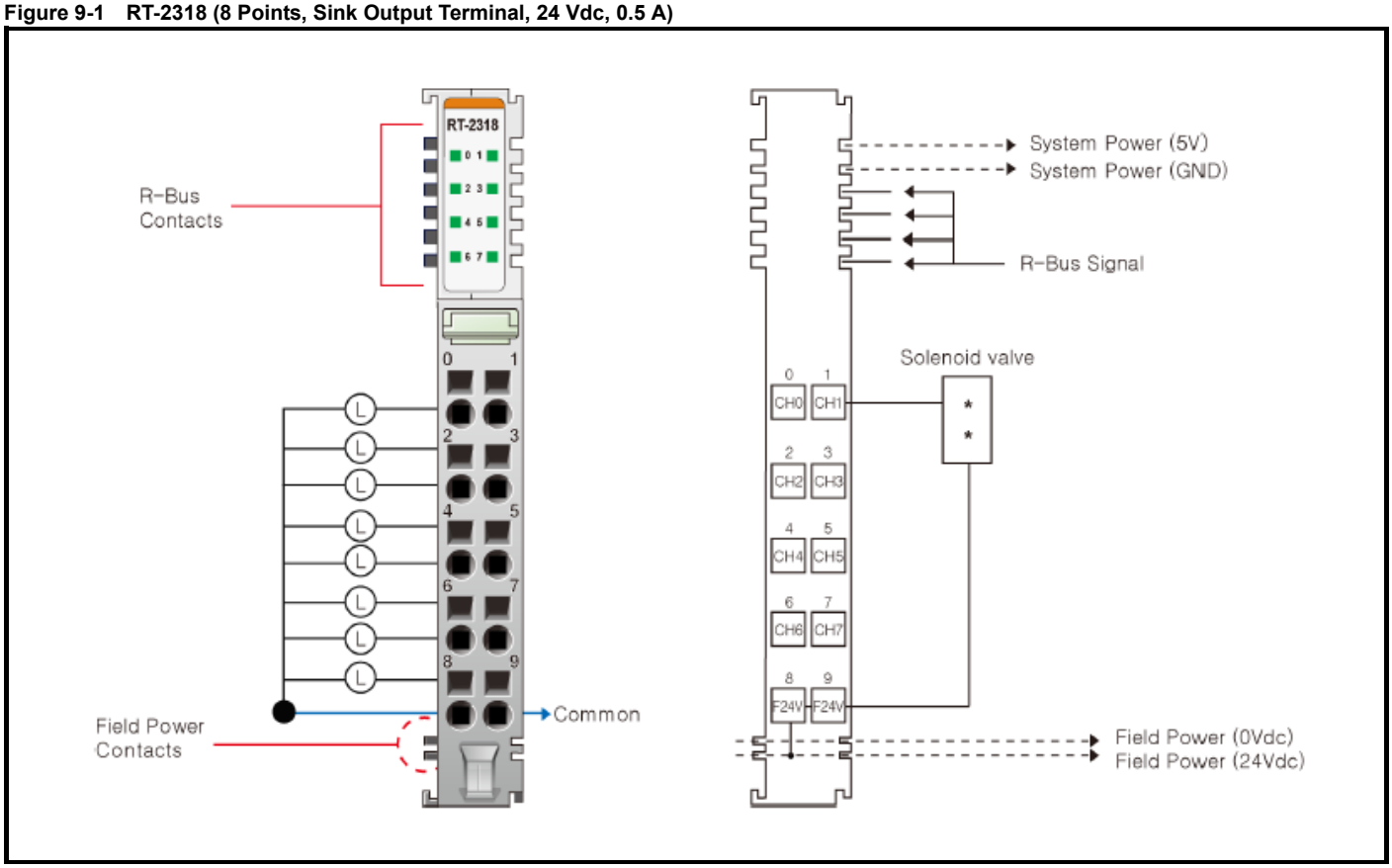
- Input image value

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	D7	D6	D5	D4	D3	D2	D1	D0
Byte 1	D15	D14	D13	D12	D11	D10	D9	D8

9 Digital Output

9.1 RT-2318 (8 Points, Sink Output Terminal, 24 Vdc, 0.5 A)

Figure 9-1 RT-2318 (8 Points, Sink Output Terminal, 24 Vdc, 0.5 A)



Pin number	Signal description	Signal description	Pin number
0	Output Channel 0	Output Channel 1	1
2	Output Channel 2	Output Channel 3	3
4	Output Channel 4	Output Channel 5	5
6	Output Channel 6	Output Channel 7	7
8	Common (Field Power 24 V)	Common (Field Power 24 V)	9

Table 9-1 Environmental specification

Environmental specifications	
Operating temperature	-20 °C to 60 °C
Storage temperature	-40 °C to 85 °C
Relative humidity	5 % to 90 % non-condensing
Operating altitude	2000 m
Mounting	DIN rail
Output specification	
Outputs Per Module	8 Points Sink Type
Indicators	8 Green Output Status LEDs
Output Voltage Range	24 Vdc (Min. 15 Vdc to Max. 32 Vdc)
ON-state Voltage Drop	Max. 0.3 Vdc @ 25 °C / 0.5 Vdc @ 60 °C
ON-State Min. Current	Min. 1 mA / Channel
OFF-State Leakage Current	Max. 25 uA
Output Signal Delay	OFF to ON: Max. 0.3 ms ON to OFF: Max. 0.3 ms
Output Current Rating	Max. 0.5 A / Channel
Protection	Over Current limit: Min. 3.5 A @ 25 °C / Channel
Common Type	8 Points / 2 Common
General specifications	
Shock operating	IEC 60068-2-27
Vibration resistance	Sine Vibration (Based on IEC 60068-2-6) - • 5 to 25 Hz: ± 1.6 mm • 25 to 300 Hz: 4 g • Sweep Rate: 1 Oct/min, 20 Sweeps Random Vibration (Based on IEC 60068-2-64) • 10 to 40 Hz: 0.0125 g^2/ Hz • 40 to 100 Hz: 0.0125 → 0.002 g^2 /Hz • 100 to 500 Hz: 0.002 g^2/ Hz • 500 to 2000 Hz: 0.002 → 1.3 x 10-$^4g^2$/ Hz • Test time: 1 hr for each test
EMC resistance burst/ESD	EN 61000-6-2: 2005 EN 61000-6-4/A11: 2011
Installation Pos. / Protect. Class	Variable/IP20
Product certifications	CE, FCC, RoHS, Reach, UL, KC(MSIP-REM-CV3-RT-2318)
Power Dissipation	Max. 110 mA @ 5 Vdc
Isolation	I/O to Logic: Photocoupler Isolation Field Power: Non-Isolation
Field Power	Supply Voltage: 24 Vdc nominal Voltage Range: 15 to 32 Vdc
Wiring	I/O Cable Max. 2.0 mm^2 (AWG 14)
Weight	58 g
Module size	12 mm x 99 mm x 70 mm

9.2 RT-2318 LED Indicator

Table 9-2 LED Indicator

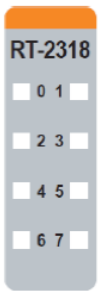
Module	LED number	LED function / description	LED colour
	0	OUTPUT Channel 0	Green
	1	OUTPUT Channel 1	
	2	OUTPUT Channel 2	
	3	OUTPUT Channel 3	
	4	OUTPUT Channel 4	
	5	OUTPUT Channel 5	
	6	OUTPUT Channel 6	
	7	OUTPUT Channel 7	

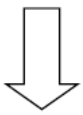
Table 9-3 Channel Status LED

Status	LED	To indicate
Off Signal	Off	No Output Signal
On Signal	Green	Normal Operation

9.3 Mapping data into the image table

- Output Image Value

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	D7	D6	D5	D4	D3	D2	D1	D0



- Output Module Data

D7	D6	D5	D4	D3	D2	D1	D0

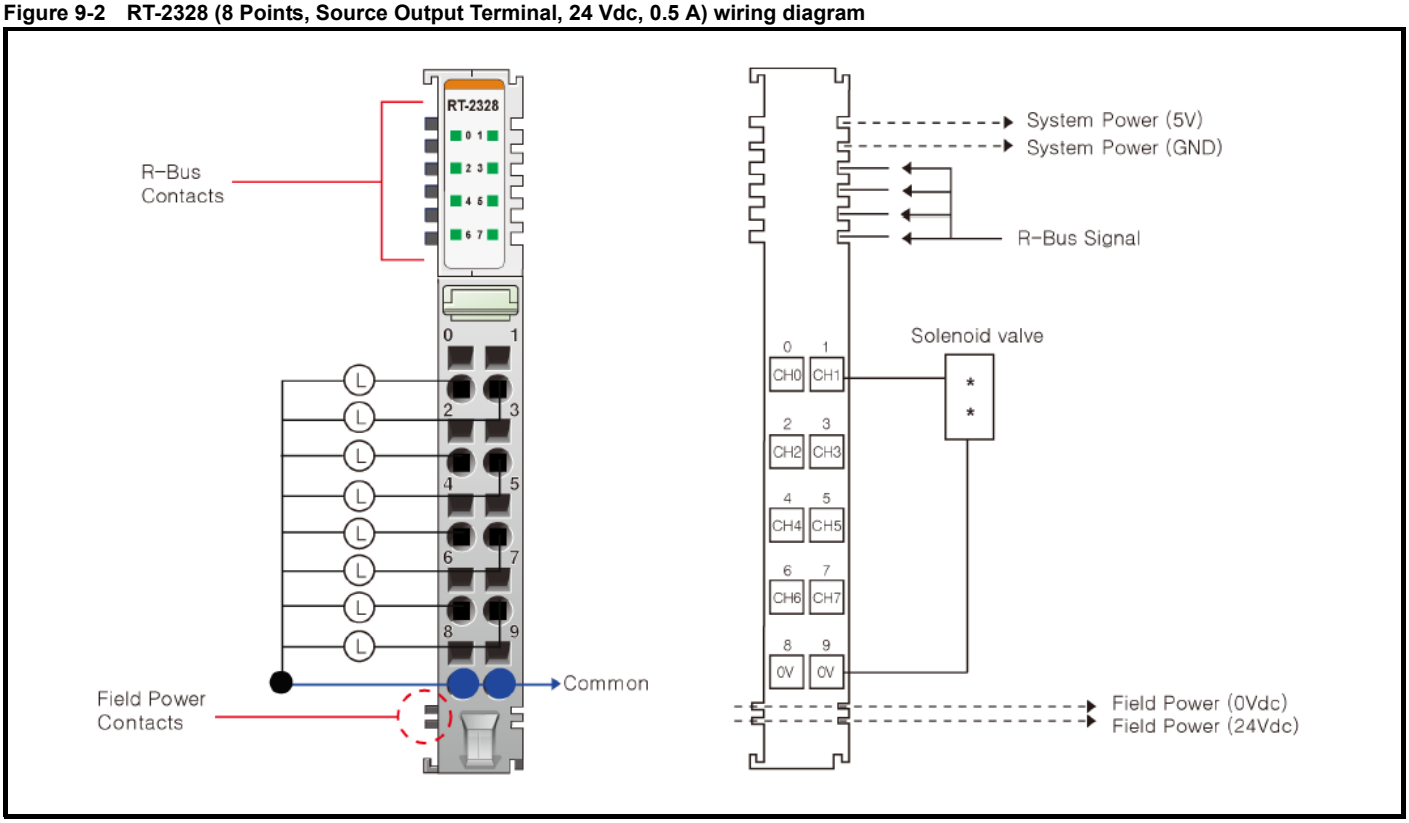
9.4 Parameter data

- Valid Parameter length: 2 Bytes
- Parameter data

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Fault Action (ch0 to ch7) 0: Fault value, 1: Hold last state							
Byte 1	Fault value (ch0 to ch7) 0: Off, 1: On							

9.5 RT-2328 (8 Points, Source Output Terminal, 24 Vdc, 0.5 A)

Figure 9-2 RT-2328 (8 Points, Source Output Terminal, 24 Vdc, 0.5 A) wiring diagram



Pin number	Signal description	Signal description	Pin number
0	Output Channel 0	Output Channel 1	1
2	Output Channel 2	Output Channel 3	3
4	Output Channel 4	Output Channel 5	5
6	Output Channel 6	Output Channel 7	7
8	Common (Field Power 0V)	Common (Field Power 0V)	9

Table 9-4 Environmental specification

Environmental specifications	
Operating temperature	-20 °C to 60 °C
Storage temperature	-40 °C to 85 °C
Relative humidity	5 % to 90 % non-condensing
Operating altitude	2000 m
Mounting	DIN rail
Output specification	
Outputs Per Module	8 Points Source Type
Indicators	8 Green Output Status LEDs
Output Voltage Range	24 Vdc (Min. 15 Vdc to Max. 32 Vdc)
ON-state Voltage Drop	Max. 0.3 Vdc @ 25 °C / 0.5 Vdc @ 60 °C
ON-State Min. Current	Min. 1 mA / Channel
OFF-State Leakage Current	Max. 5 uA
Output Signal Delay	OFF to ON: Max. 0.3 ms ON to OFF: Max. 0.3 ms
Output Current Rating	Max. 0.5 A / Channel
Protection	Over Current limit: Min. 3.0 A @ 25 °C / Channel
Common Type	8 Points / 2 Common
General specifications	
Shock operating	IEC 60068-2-27
Vibration resistance	Sine Vibration (Based on IEC 60068-2-6) - • 5 to 25 Hz: ± 1.6 mm • 25 to 300 Hz: 4 g • Sweep Rate: 1 Oct/min, 20 Sweeps Random Vibration (Based on IEC 60068-2-64) • 10 to 40 Hz: 0.0125 g^2/ Hz • 40 to 100 Hz: 0.0125 → 0.002 g^2 /Hz • 100 to 500 Hz: 0.002 g^2/ Hz • 500 to 2000 Hz: 0.002 → 1.3 x 10-$^4g^2$/ Hz • Test time: 1 hr for each test
EMC resistance burst/ESD	EN 61000-6-2: 2005 EN 61000-6-4/A11: 2011
Installation Pos. / Protect. Class	Variable/IP20
Product certifications	CE, FCC, RoHS, Reach, UL, KC(MSIP-REM-CV3-RT-2328)
Power Dissipation	Max. 90 mA @ 5 Vdc
Isolation	I/O to Logic: Photocoupler Isolation Field Power: Non-Isolation
Field Power	Supply Voltage: 24 Vdc nominal Voltage Range: 15 to 32 Vdc
Wiring	I/O Cable Max. 2.0 mm^2 (AWG 14)
Weight	58 g
Module size	12 mm x 99 mm x 70 mm

9.6 RT-2328 LED Indicator

Table 9-5 LED Indicator

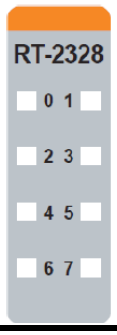
Module	LED number	LED function / description	LED colour
	0	OUTPUT Channel 0	Green
	1	OUTPUT Channel 1	
	2	OUTPUT Channel 2	
	3	OUTPUT Channel 3	
	4	OUTPUT Channel 4	
	5	OUTPUT Channel 5	
	6	OUTPUT Channel 6	
	7	OUTPUT Channel 7	

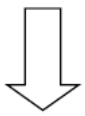
Table 9-6 Channel Status LED

Status	LED	To indicate
Off Signal	Off	No Output Signal
On Signal	Green	Normal Operation

9.7 Mapping data into the image table

- Output Image Value

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	D7	D6	D5	D4	D3	D2	D1	D0



- Output Module Data

D7	D6	D5	D4	D3	D2	D1	D0

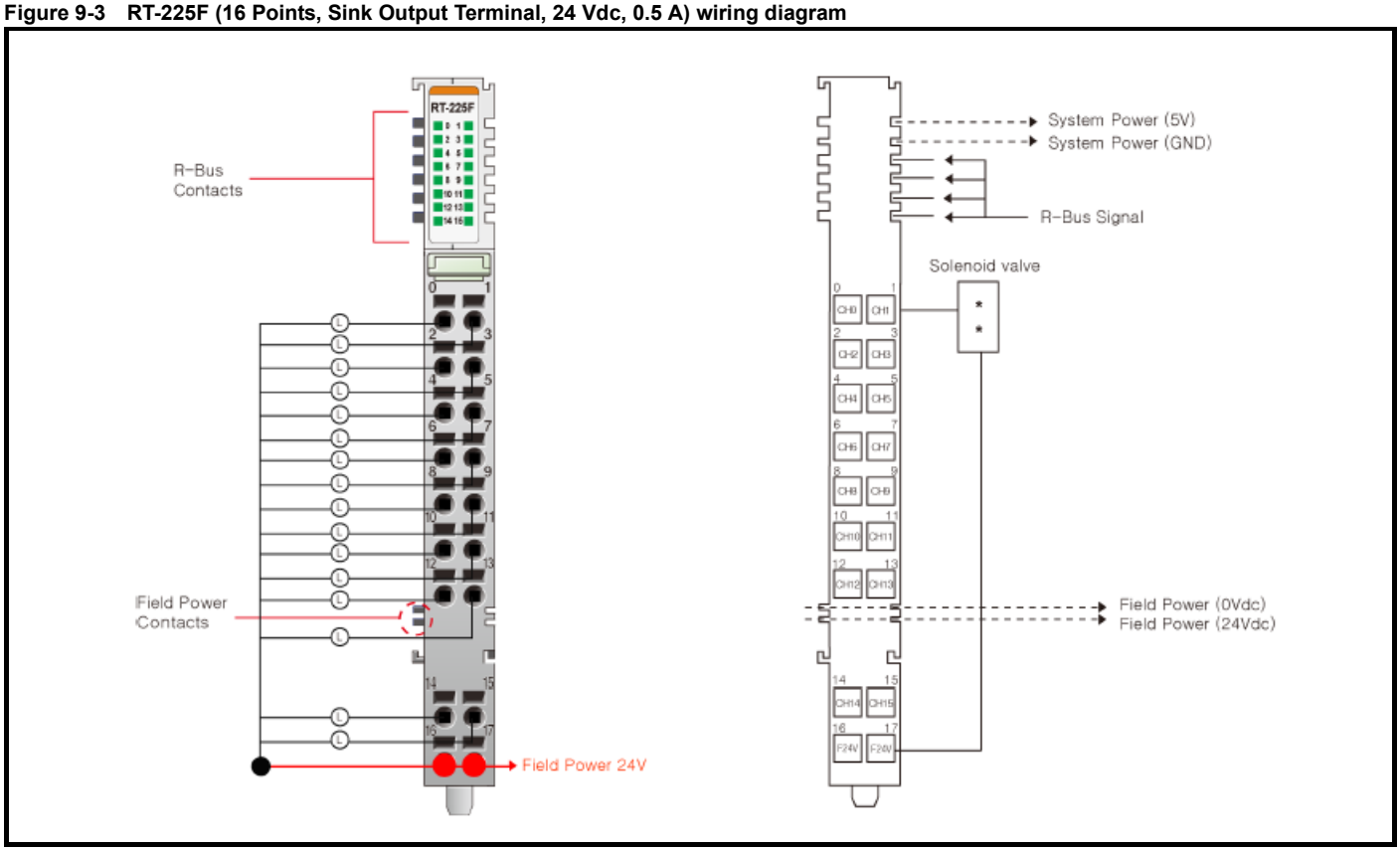
9.8 Parameter data

- Valid Parameter length: 2 Bytes
- Parameter data

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Fault Action (ch0 to ch7) 0: Fault value, 1: Hold last state							
Byte 1	Fault value (ch0 to ch7) 0: Off, 1: On							

9.9 RT-225F (16 Points, Sink Output Terminal, 24 Vdc, 0.5 A)

Figure 9-3 RT-225F (16 Points, Sink Output Terminal, 24 Vdc, 0.5 A) wiring diagram



Pin number	Signal description	Signal description	Pin number
0	Output Channel 0	Output Channel 1	1
2	Output Channel 2	Output Channel 3	3
4	Output Channel 4	Output Channel 5	5
6	Output Channel 6	Output Channel 7	7
8	Output Channel 8	Output Channel 9	9
10	Output Channel 10	Output Channel 11	11
12	Output Channel 12	Output Channel 13	13
14	Output Channel 14	Output Channel 15	15
16	Common (Field Power 24 V)	Common (Field Power 24 V)	17

Table 9-7 Environmental specification

Environmental specifications	
Operating temperature	-20 °C to 60 °C
Storage temperature	-40 °C to 85 °C
Relative humidity	5 % to 90 % non-condensing
Operating altitude	2000 m
Mounting	DIN rail
Output specification	
Outputs Per Module	16 Points Sink Type
Indicators	16 Green Output Status LEDs
Output Voltage Range	24 Vdc (Min. 15 Vdc to Max. 32 Vdc)
ON-state Voltage Drop	Max. 0.3 Vdc @ 25 °C / 0.5 Vdc @ 60 °C
ON-State Min. Current	Min. 1 mA / Channel
OFF-State Leakage Current	Max. 5 uA
Output Signal Delay	OFF to ON: Max. 0.3 ms ON to OFF: Max. 0.3 ms
Output Current Rating	Max. 0.5 A / Channel
Protection	Over Current limit: Min.2.5 A @ 25 °C / Channel
Common Type	16 Points / 2 Common
General specifications	
Shock operating	IEC 60068-2-27
Vibration resistance	Sine Vibration (Based on IEC 60068-2-6) - • 5 to 25 Hz: ± 1.6 mm • 25 to 300 Hz: 4 g • Sweep Rate: 1 Oct/min, 20 Sweeps Random Vibration (Based on IEC 60068-2-64) • 10 to 40 Hz: 0.0125 g^2/ Hz • 40 to 100 Hz: 0.0125 → 0.002 g^2 /Hz • 100 to 500 Hz: 0.002 g^2/ Hz • 500 to 2000 Hz: 0.002 → 1.3 x $10^{-4}g^2$/ Hz • Test time: 1 hr for each test
EMC resistance burst/ESD	EN 61000-6-2: 2005 EN 61000-6-4/A11: 2011
Installation Pos. / Protect. Class	Variable/IP20
Product certifications	CE, FCC, RoHS, Reach, UL, KC (MSIP-REM-CV3-RT-225F)
Power Dissipation	Max. 100 mA @ 5 Vdc
Isolation	I/O to Logic: Photocoupler Isolation Field Power: Non-Isolation
Field Power	Supply Voltage: 24 Vdc nominal Voltage Range: 15 to 32 Vdc
Wiring	I/O Cable Max. 1.0 mm^2 (AWG 18)
Weight	68 g
Module size	12 mm x 120 mm x 70 mm

9.10 RT-225F LED Indicator

Table 9-8 LED Indicator

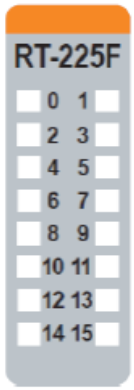
Module	LED number	LED function / description	LED colour
	0	OUTPUT Channel 0	Green
	1	OUTPUT Channel 1	
	2	OUTPUT Channel 2	
	3	OUTPUT Channel 3	
	4	OUTPUT Channel 4	
	5	OUTPUT Channel 5	
	6	OUTPUT Channel 6	
	7	OUTPUT Channel 7	
	8	OUTPUT Channel 8	
	9	OUTPUT Channel 9	
	10	OUTPUT Channel 10	
	11	OUTPUT Channel 11	
	12	OUTPUT Channel 12	
	13	OUTPUT Channel 13	
	14	OUTPUT Channel 14	
	15	OUTPUT Channel 15	

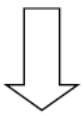
Table 9-9 Channel Status LED

Status	LED	To indicate
Off Signal	Off	No Output Signal
On Signal	Green	Normal Operation

9.11 Mapping data into the image table

- Output Image Value

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	D7	D6	D5	D4	D3	D2	D1	D0
Byte 1	D15	D14	D13	D12	D11	D10	D9	D8



- Output Module Data

D7	D6	D5	D4	D3	D2	D1	D0
D15	D14	D13	D12	D11	D10	D9	D8

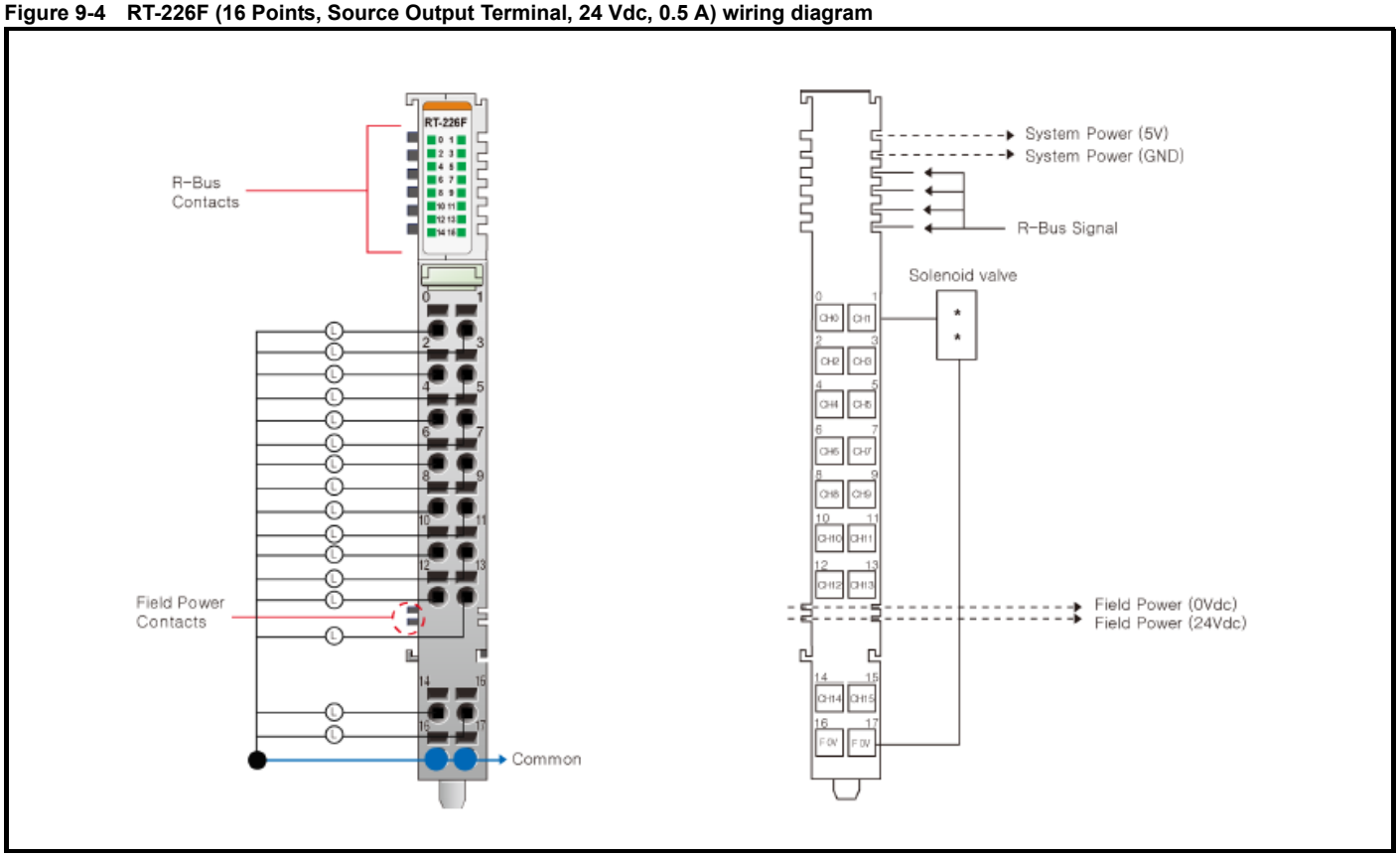
9.12 Parameter data

- Valid Parameter length: 4 Bytes
- Parameter data

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Fault Action (ch0 to ch7) 0: Fault value, 1: Hold last state							
Byte 1	Fault Action (ch8 to ch15) 0: Fault value, 1: Hold last state							
Byte 2	Fault value (ch0 to ch7) 0: Off, 1: On							
Byte 3	Fault value (ch8 to ch15) 0: Off, 1: On							

9.13 RT-226F (16 Points, Source Output Terminal, 24 Vdc, 0.5 A)

Figure 9-4 RT-226F (16 Points, Source Output Terminal, 24 Vdc, 0.5 A) wiring diagram



Pin number	Signal description	Signal description	Pin number
0	Output Channel 0	Output Channel 1	1
2	Output Channel 2	Output Channel 3	3
4	Output Channel 4	Output Channel 5	5
6	Output Channel 6	Output Channel 7	7
8	Output Channel 8	Output Channel 9	9
10	Output Channel 10	Output Channel 11	11
12	Output Channel 12	Output Channel 13	13
14	Output Channel 14	Output Channel 15	15
16	Common (Field Power 0V)	Common (Field Power 0V)	17

Table 9-10 Environmental specification

Environmental specifications	
Operating temperature	-20 °C to 60 °C
Storage temperature	-40 °C to 85 °C
Relative humidity	5 % to 90 % non-condensing
Operating altitude	2000 m
Mounting	DIN rail
Output specification	
Outputs Per Module	16 Points Source Type
Indicators	16 Green Output Status LEDs
Output Voltage Range	24 Vdc (Min. 15 Vdc to Max. 32 Vdc)
ON-state Voltage Drop	Max. 0.3 Vdc @ 25 °C / 0.5 Vdc @ 60 °C
ON-State Min. Current	Min. 1 mA / Channel
OFF-State Leakage Current	Max. 5 uA
Output Signal Delay	OFF to ON: Max. 0.3 ms ON to OFF: Max. 0.3 ms
Output Current Rating	Max. 0.5 A / Channel
Protection	Over Current limit: Min.3.0 A @ 25 °C / Channel
Common Type	16 Points / 2 Common
General specifications	
Shock operating	IEC 60068-2-27
Vibration resistance	Sine Vibration (Based on IEC 60068-2-6) - • 5 to 25 Hz: ± 1.6 mm • 25 to 300 Hz: 4 g • Sweep Rate: 1 Oct/min, 20 Sweeps Random Vibration (Based on IEC 60068-2-64) • 10 to 40 Hz: 0.0125 g^2/ Hz • 40 to 100 Hz: 0.0125 → 0.002 g^2 /Hz • 100 to 500 Hz: 0.002 g^2/ Hz • 500 to 2000 Hz: 0.002 → 1.3 x 10-$^4g^2$/ Hz • Test time: 1 hr for each test
EMC resistance burst/ESD	EN 61000-6-2: 2005 EN 61000-6-4/A11: 2011
Installation Pos. / Protect. Class	Variable/IP20
Product certifications	CE, FCC, RoHS, Reach, UL, KC(MSIP-REM-CV3-RT-226F)
Power Dissipation	Max. 100 mA @ 5 Vdc
Isolation	I/O to Logic: Photocoupler Isolation Field Power: Non-Isolation
Field Power	Supply Voltage: 24 Vdc nominal Voltage Range: 15 to 32 Vdc
Wiring	I/O Cable Max. 1.0 mm^2 (AWG 18)
Weight	70 g
Module size	12 mm x 120 mm x 70 mm

9.14 RT-226F LED Indicator

Table 9-11 LED Indicator

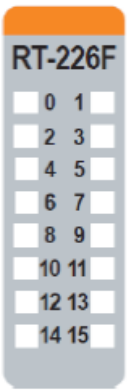
Module	LED number	LED function / description	LED colour
	0	OUTPUT Channel 0	Green
	1	OUTPUT Channel 1	
	2	OUTPUT Channel 2	
	3	OUTPUT Channel 3	
	4	OUTPUT Channel 4	
	5	OUTPUT Channel 5	
	6	OUTPUT Channel 6	
	7	OUTPUT Channel 7	
	8	OUTPUT Channel 8	
	9	OUTPUT Channel 9	
	10	OUTPUT Channel 10	
	11	OUTPUT Channel 11	
	12	OUTPUT Channel 12	
	13	OUTPUT Channel 13	
	14	OUTPUT Channel 14	
	15	OUTPUT Channel 15	

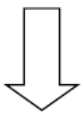
Table 9-12 Channel Status LED

Status	LED	To indicate
Off Signal	Off	No Output Signal
On Signal	Green	Normal Operation

9.15 Mapping data into the image table

- Output Image Value

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	D7	D6	D5	D4	D3	D2	D1	D0
Byte 1	D15	D14	D13	D12	D11	D10	D9	D8



- Output Module Data

D7	D6	D5	D4	D3	D2	D1	D0
D15	D14	D13	D12	D11	D10	D9	D8

9.16 Parameter data

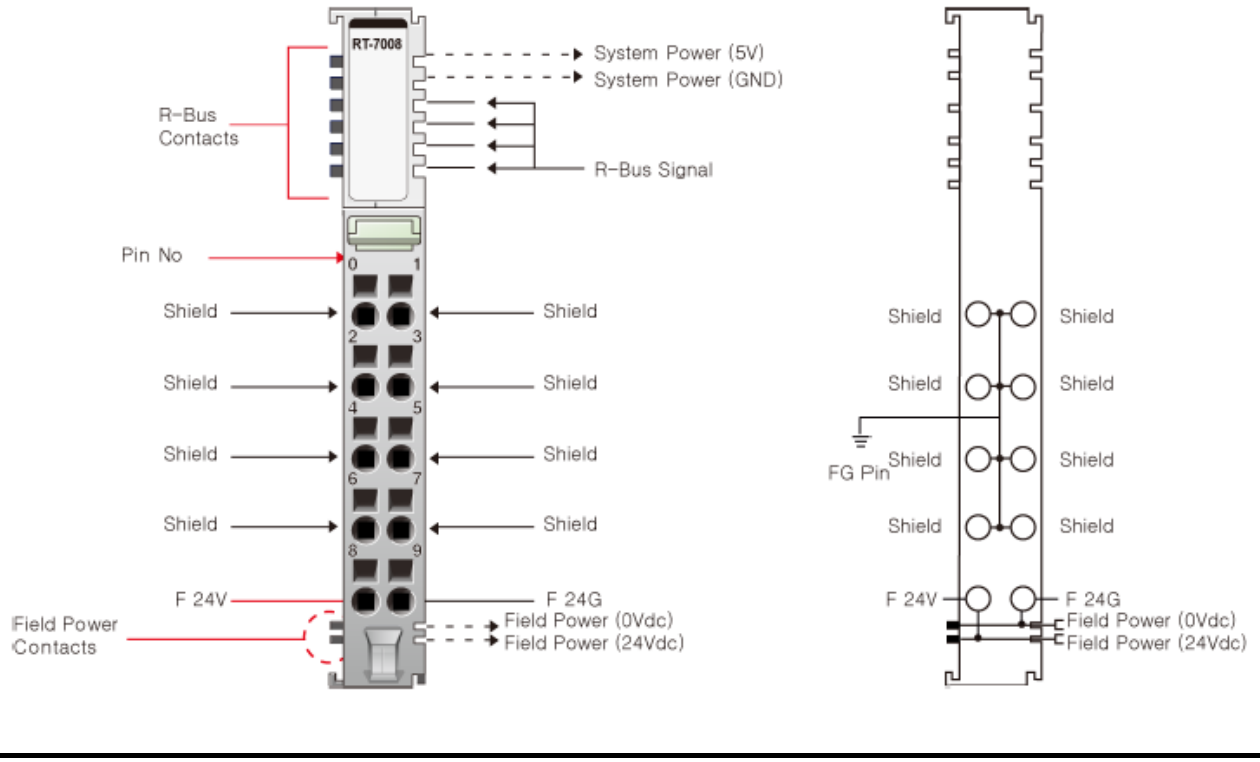
- Valid Parameter length: 4 Bytes
- Parameter data

Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Fault Action (ch0 to ch7) 0: Fault value, 1: Hold last state							
Byte 1	Fault Action (ch8 to ch15) 0: Fault value, 1: Hold last state							
Byte 2	Fault value (ch0 to ch7) 0: Off, 1: On							
Byte 3	Fault value (ch8 to ch15) 0: Off, 1: On							

10 Power module

10.1 RT-7008 (8 Channels, Shield Module)

Figure 10-1 RT-7008 (8 Channels, Shield Module) wiring diagram



Pin number	Signal description	Signal description	Pin number
0	FG	FG	1
2	FG	FG	3
4	FG	FG	5
6	FG	FG	7
8	Field power, 24 V	Field power, ground	9

Table 10-1 Environmental specification

Environmental specifications	
Operating temperature	-20 °C to 60 °C
Storage temperature	-40 °C to 85 °C
Relative humidity	5 % to 90 % non-condensing
Operating altitude	2000 m
Mounting	DIN rail
Input specification	
Field Power Voltage	Shield
Field Power Contacts Current	Max. 10 A
Indicators	No LED
R-BUS Power Contactor	Yes
General specifications	
Shock operating	IEC 60068-2-27
Vibration resistance	Sine Vibration (Based on IEC 60068-2-6) - • 5 to 25 Hz: ± 1.6 mm • 25 to 300 Hz: 4 g • Sweep Rate: 1 Oct/min, 20 Sweeps Random Vibration (Based on IEC 60068-2-64) • 10 to 40 Hz: 0.0125 g^2/ Hz • 40 to 100 Hz: 0.0125 → 0.002 g^2 /Hz • 100 to 500 Hz: 0.002 g^2/ Hz • 500 to 2000 Hz: 0.002 → 1.3 x 10-$^4g^2$/ Hz • Test time: 1 hr for each test
EMC resistance burst/ESD	EN 61000-6-2: 2005 EN 61000-6-4/A11: 2011
Installation Pos. / Protect. Class	Variable/IP20
Product certifications	CE, FCC, RoHS, Reach, UL, KC(MSIP-REM-CV3-RT-7008)
Wiring	I/O Cable Max. 2.0 mm^2 (AWG 14)
Weight	59 g
Module size	12 mm x 99 mm x 70 mm

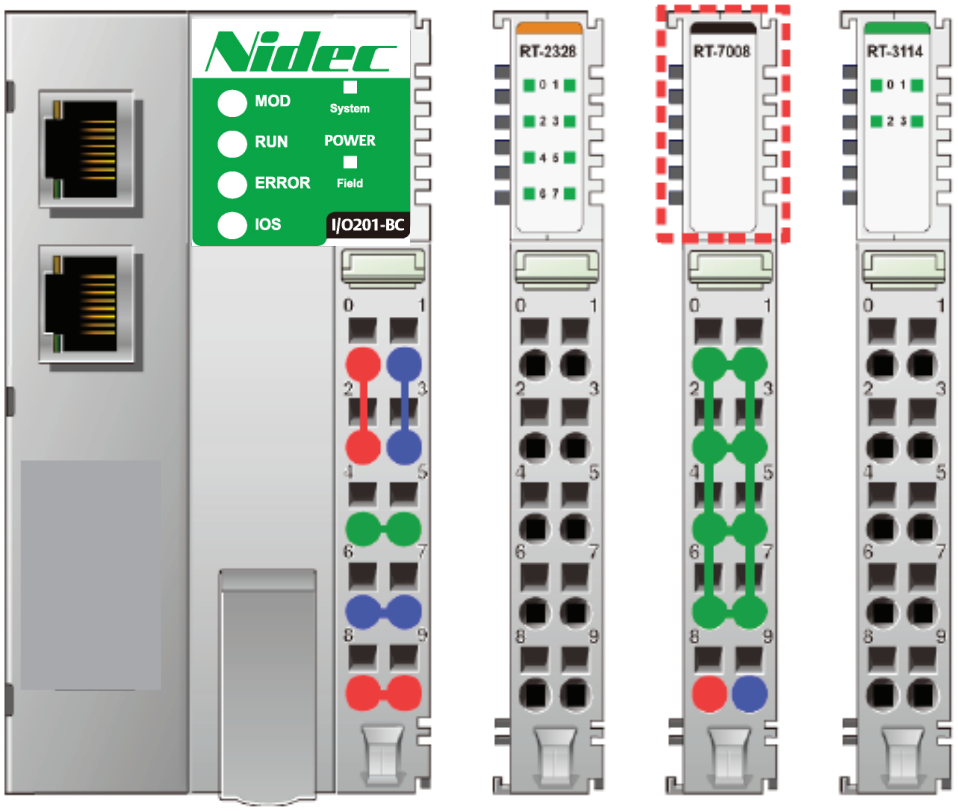
10.2 RT-7008 LED Indicator

Table 10-2 LED Non Indicator

Module	LED number	LED function / description	LED colour
	LED	Non Indicator	N/A

10.3 RT-7008 example

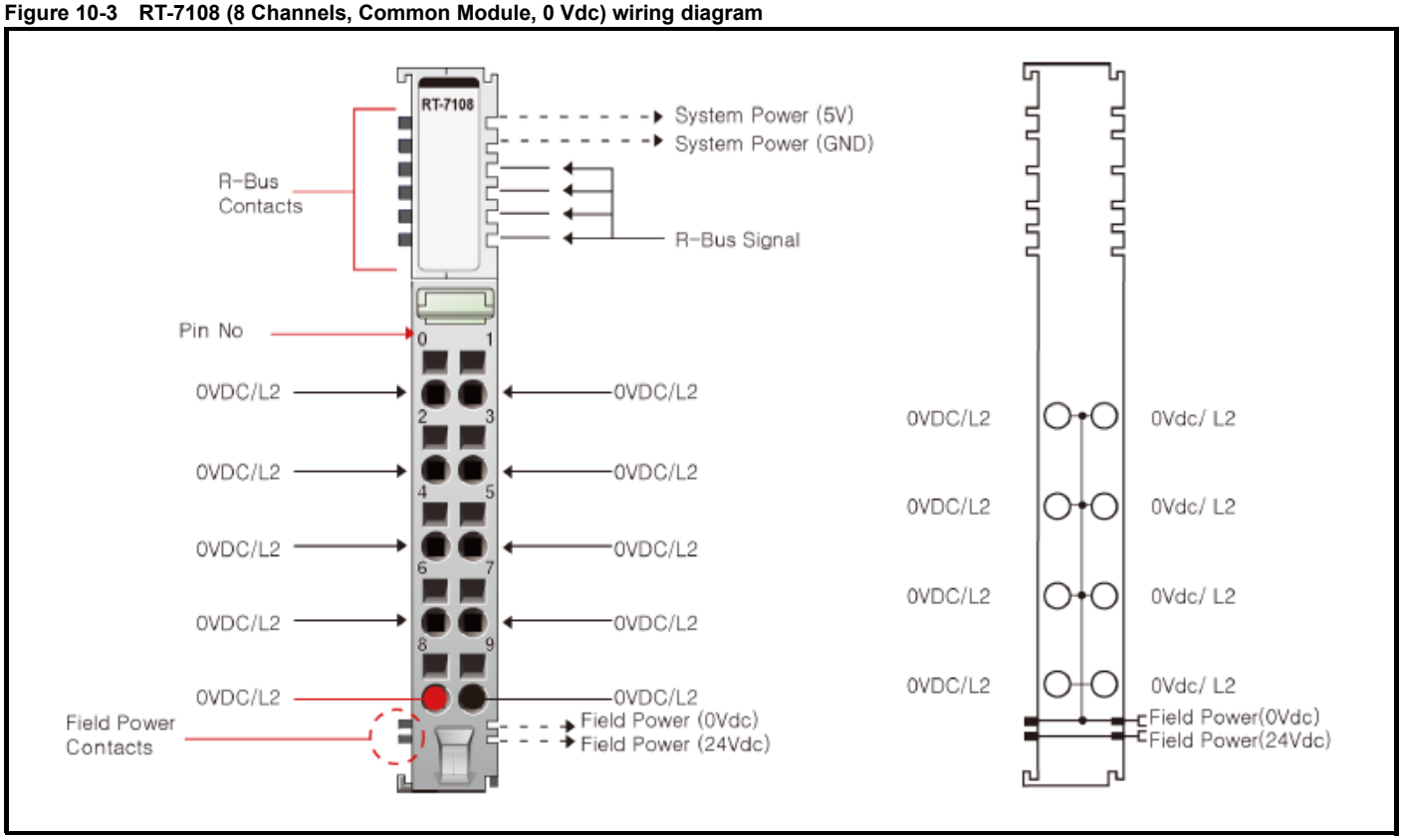
Figure 10-2 The RT-7008 provides Shield



Color	System Power	Field Power
Hole Number	0, 2	8, 9
Hole Number	1, 3	6, 7
Hole Number	4, 5 (F.G)	

10.4 RT-7108 (8 Channels, Common Module, 0V dc)

Figure 10-3 RT-7108 (8 Channels, Common Module, 0 Vdc) wiring diagram



Pin number	Signal description	Signal description	Pin number
0	0V dc / L2	0V dc / L2	1
2	0V dc / L2	0V dc / L2	3
4	0V dc / L2	0V dc / L2	5
6	0V dc / L2	0V dc / L2	7
8	0V dc / L2	0V dc / L2	9

Table 10-3 Environmental specification

Environmental specifications	
Operating temperature	-20 °C to 60 °C
Storage temperature	-40 °C to 85 °C
Relative humidity	5 % to 90 % non-condensing
Operating altitude	2000 m
Mounting	DIN rail
Input specification	
Field Power Voltage	0V dc
Field Power Contacts Current	Max. 10 A
Indicators	No LED
R-BUS Power Contactor	Yes
General specifications	
Shock operating	IEC 60068-2-27
Vibration resistance	Sine Vibration (Based on IEC 60068-2-6) - • 5 to 25 Hz: ± 1.6 mm • 25 to 300 Hz: 4 g • Sweep Rate: 1 Oct/min, 20 Sweeps Random Vibration (Based on IEC 60068-2-64) • 10 to 40 Hz: 0.0125 g^2/ Hz • 40 to 100 Hz: 0.0125 → 0.002 g^2 /Hz • 100 to 500 Hz: 0.002 g^2/ Hz • 500 to 2000 Hz: 0.002 → 1.3 x $10^{-4}g^2$/ Hz • Test time: 1 hr for each test
EMC resistance burst/ESD	EN 61000-6-2: 2005 EN 61000-6-4/A11: 2011
Installation Pos. / Protect. Class	Variable/IP20
Product certifications	UL
Wiring	I/O Cable Max. 2.0 mm^2 (AWG 14)
Weight	59 g
Module size	12 mm x 99 mm x 70 mm

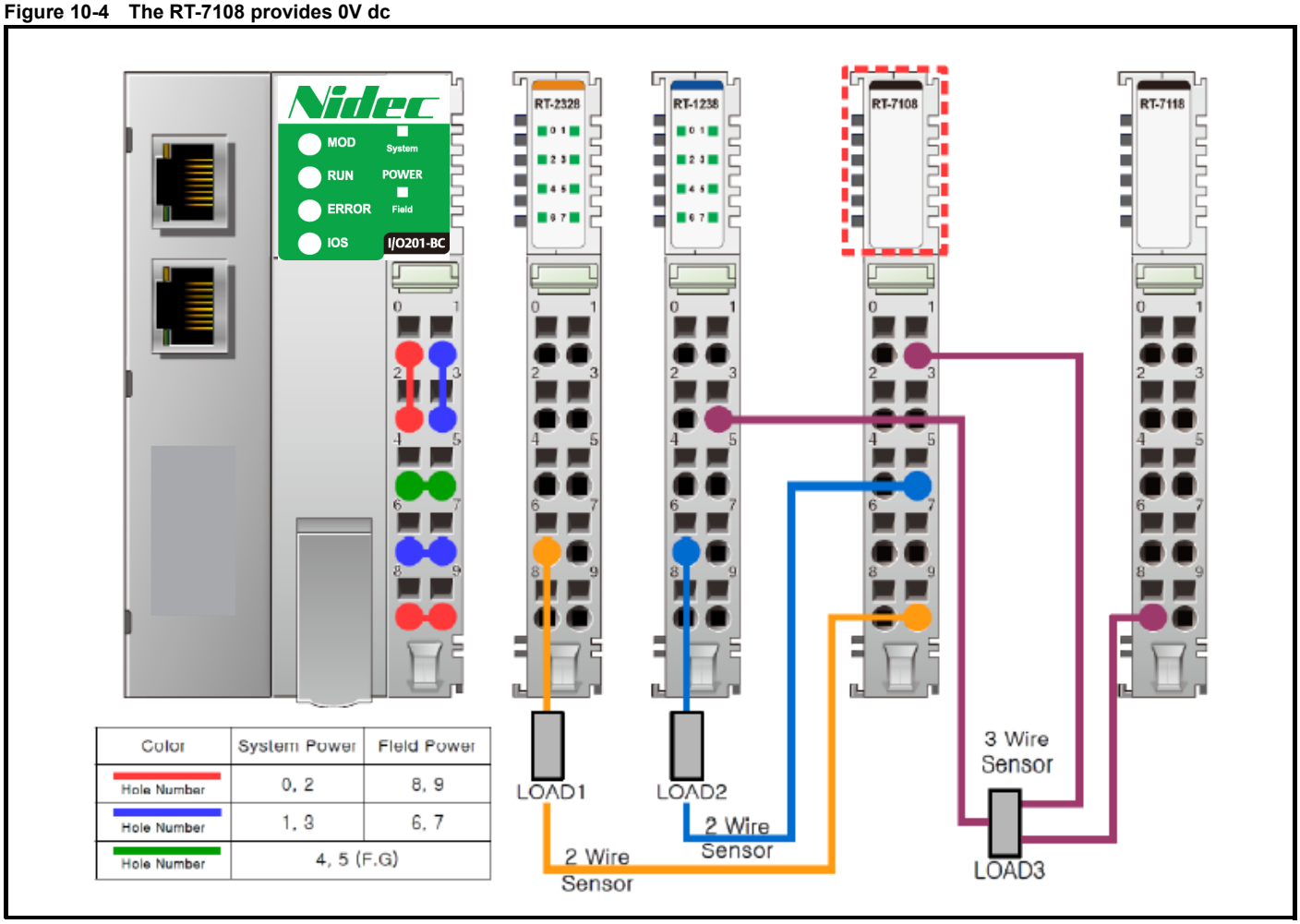
10.5 RT-7108 LED Indicator

Table 10-4 LED Non Indicator

Module	LED number	LED function / description	LED colour
	LED	Non Indicator	N/A

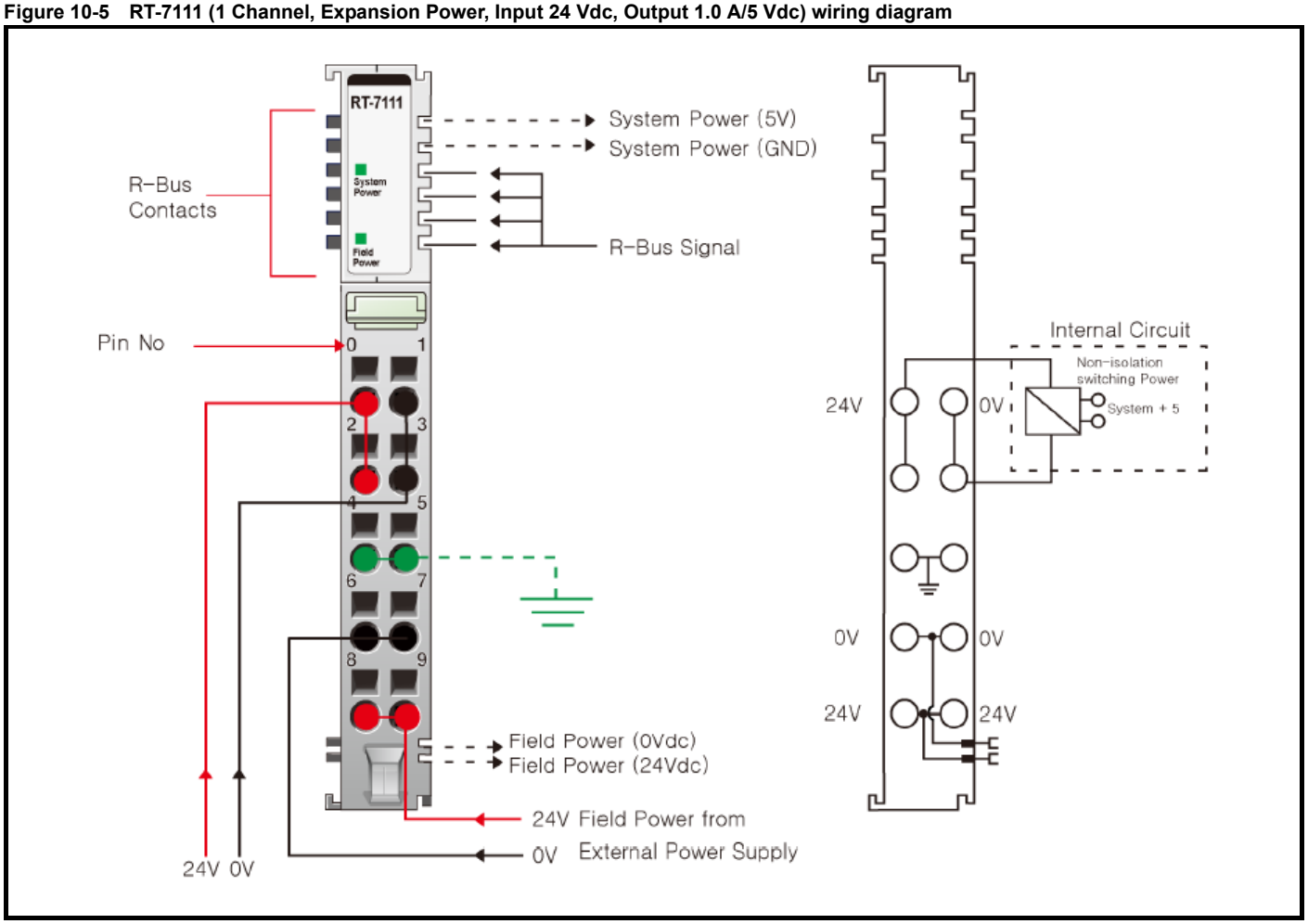
10.6 RT-7108 example

Figure 10-4 The RT-7108 provides 0V dc



10.7 RT-7111 (1 Channel, Expansion Power, Input 24 Vdc, Output 1.0 A/5 Vdc)

Figure 10-5 RT-7111 (1 Channel, Expansion Power, Input 24 Vdc, Output 1.0 A/5 Vdc) wiring diagram



Pin number	Signal description	Signal description	Pin number
0	System Power, 24 V	System Power, Ground	1
2	System Power, 24 V	System Power, Ground	3
4	F.G	F.G	5
6	Field Power, Ground	Field Power, Ground	7
8	Field Power, 24 V	Field Power, 24 V	9

Table 10-5 Environmental specification

Environmental specifications	
Operating temperature	-20 °C to 60 °C
Storage temperature	-40 °C to 85 °C
Relative humidity	5 % to 90 % non-condensing
Operating altitude	2000 m
Mounting	DIN rail
Input / output specification	
System Power Input Voltage	Normal 24 Vdc
Field Power Input Voltage	Normal 24 Vdc
Field Power Contacts Current	Max. 10 A
Indicators	2 Green LEDs for System and Field Power
R-Bus Output Voltage	Max. 5 Vdc, 1 A
General specifications	
Shock operating	IEC 60068-2-27
Vibration resistance	Sine Vibration (Based on IEC 60068-2-6) - • 5 to 25 Hz: ± 1.6 mm • 25 to 300 Hz: 4 g • Sweep Rate: 1 Oct/min, 20 Sweeps Random Vibration (Based on IEC 60068-2-64) • 10 to 40 Hz: 0.0125 g^2/ Hz • 40 to 100 Hz: 0.0125 → 002 g^2 /Hz • 100 to 500 Hz: 0.002 g^2/ Hz • 500 to 2000 Hz: 0.002 → 1.3 x 10-$^4g^2$/ Hz • Test time: 1 hr for each test
EMC resistance burst/ESD	EN 61000-6-2: 2005 EN 61000-6-4/A11: 2011
Installation Pos. / Protect. Class	Variable/IP20
Product certifications	CE, FCC, UL, KC(MSIP-REM-CV3-RT-7111)
Wiring	I/O Cable Max. 2.0 mm^2 (AWG 14)
Weight	42 g
Module size	12 mm x 99 mm x 70 mm

10.8 RT-7111 LED Indicator

Table 10-6 LED Indicator

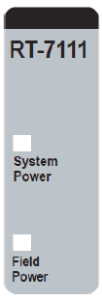
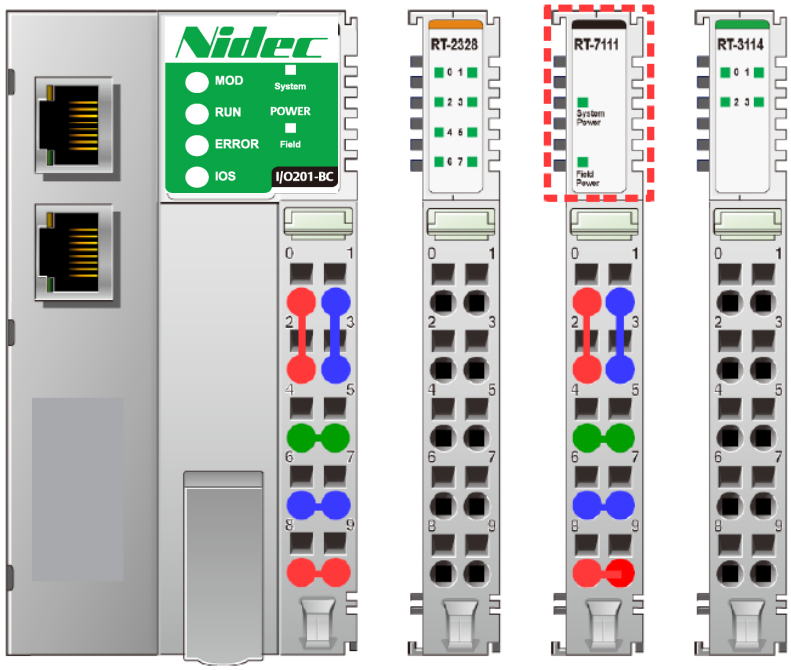
Module	LED number	LED function / description	LED colour
	System Power	System Power	Green
	Field Power	Field Power	Green

Table 10-7 Channel Status LED

Status	LED	To indicate
Off Signal	Off	No System, Field Power
On Signal	Green	Normal Operation

10.9 RT-7111 Example

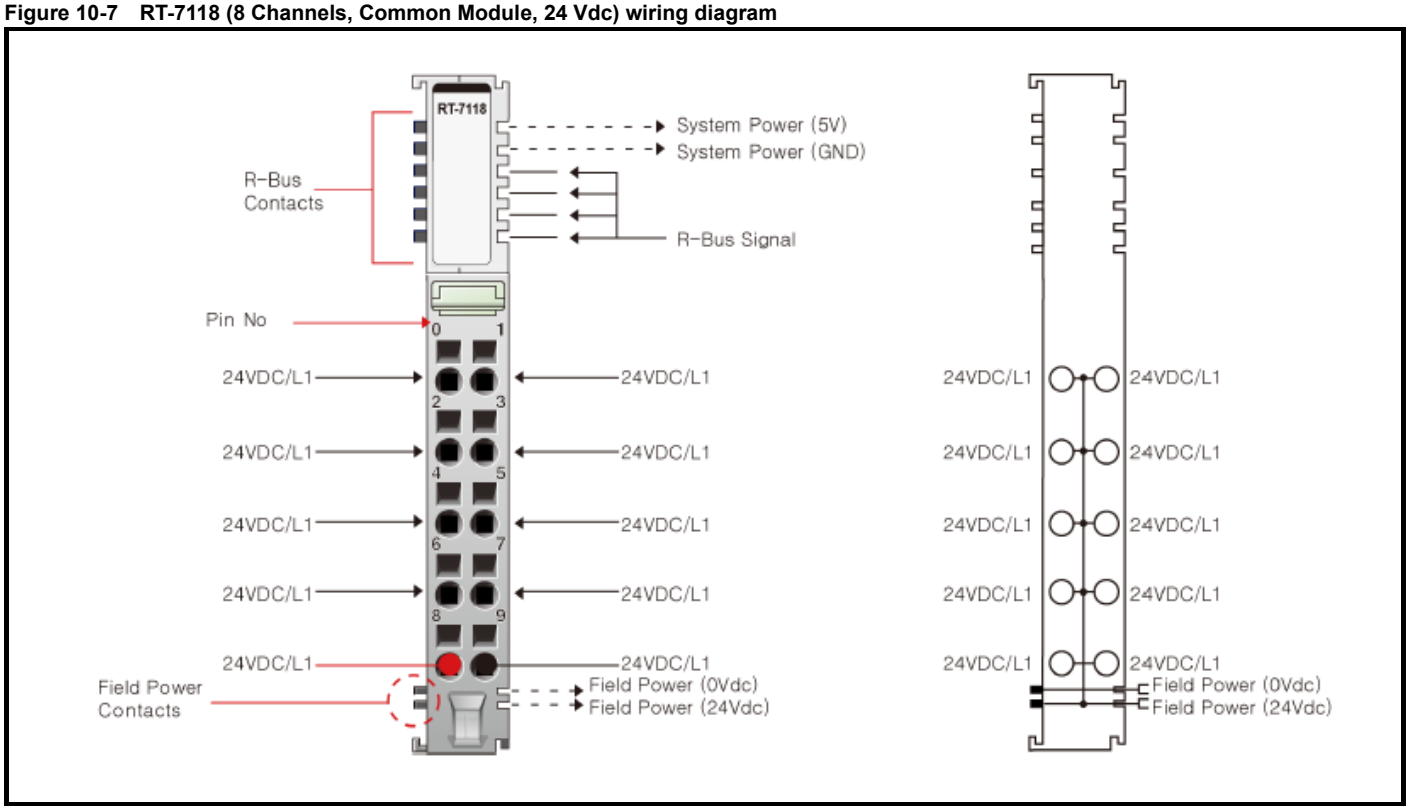
Figure 10-6 The RT-7111 provides System Power and Field Power



Color	System Power	Field Power
Hole Number	0, 2	8, 9
Hole Number	1, 3	6, 7
Hole Number	4, 5 (F.G)	

10.10 RT-7118 (8 Channels, Common Module, 24 Vdc)

Figure 10-7 RT-7118 (8 Channels, Common Module, 24 Vdc) wiring diagram



Pin number	Signal description	Signal description	Pin number
0	24 Vdc/L1	24 Vdc/L1	1
2	24 Vdc/L1	24 Vdc/L1	3
4	24 Vdc/L1	24 Vdc/L1	5
6	24 Vdc/L1	24 Vdc/L1	7
8	24 Vdc/L1	24 Vdc/L1	9

Table 10-8 Environmental specification

Environmental specifications	
Operating temperature	-20 °C to 60 °C
Storage temperature	-40 °C to 85 °C
Relative humidity	5 % to 90 % non-condensing
Operating altitude	2000 m
Mounting	DIN rail
Input specification	
Field Power Voltage	-
Field Power Contacts Current	Max. 10 A
Indicators	No LED
R-Bus Power Contactor	Yes
General specifications	
Shock operating	IEC 60068-2-27
Vibration resistance	Sine Vibration (Based on IEC 60068-2-6) - • 5 to 25 Hz: ± 1.6 mm • 25 to 300 Hz: 4 g • Sweep Rate: 1 Oct/min, 20 Sweeps Random Vibration (Based on IEC 60068-2-64) • 10 to 40 Hz: 0.0125 g^2/ Hz • 40 to 100 Hz: 0.0125 → 0.002 g^2 /Hz • 100 to 500 Hz: 0.002 g^2/ Hz • 500 to 2000 Hz: 0.002 → 1.3 x 10-$^4g^2$/ Hz • Test time: 1 hr for each test
EMC resistance burst/ESD	EN 61000-6-2: 2005 EN 61000-6-4/A11: 2011
Installation Pos. / Protect. Class	Variable/IP20
Product certifications	UL
Wiring	I/O Cable Max. 2.0 mm^2 (AWG 14)
Weight	59 g
Module size	12 mm x 99 mm x 70 mm

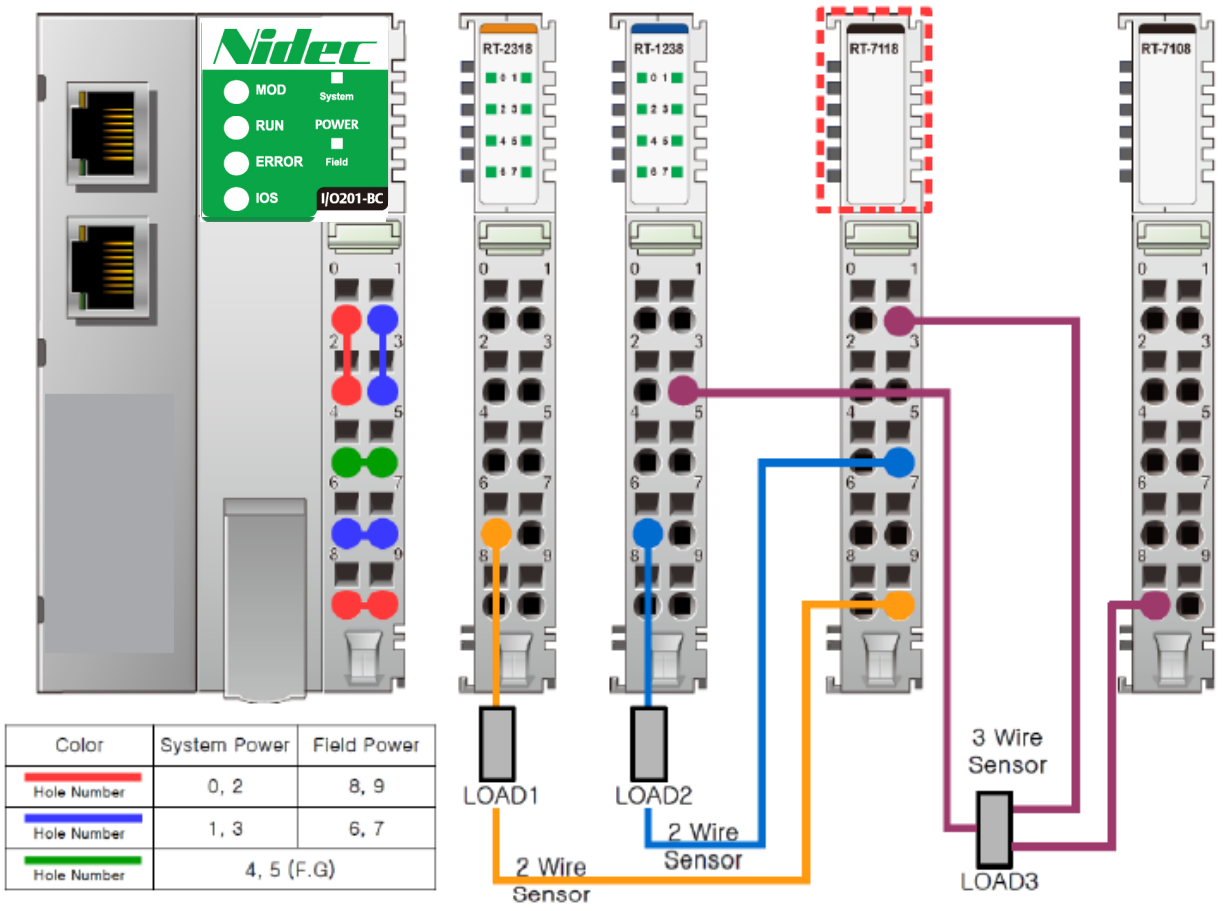
10.11 RT-7118 LED Indicator

10.11.1 LED Non Indicator

Module	LED number	LED function / description	LED colour
	LED	Non Indicator	N/A

10.12 RT-7118 example

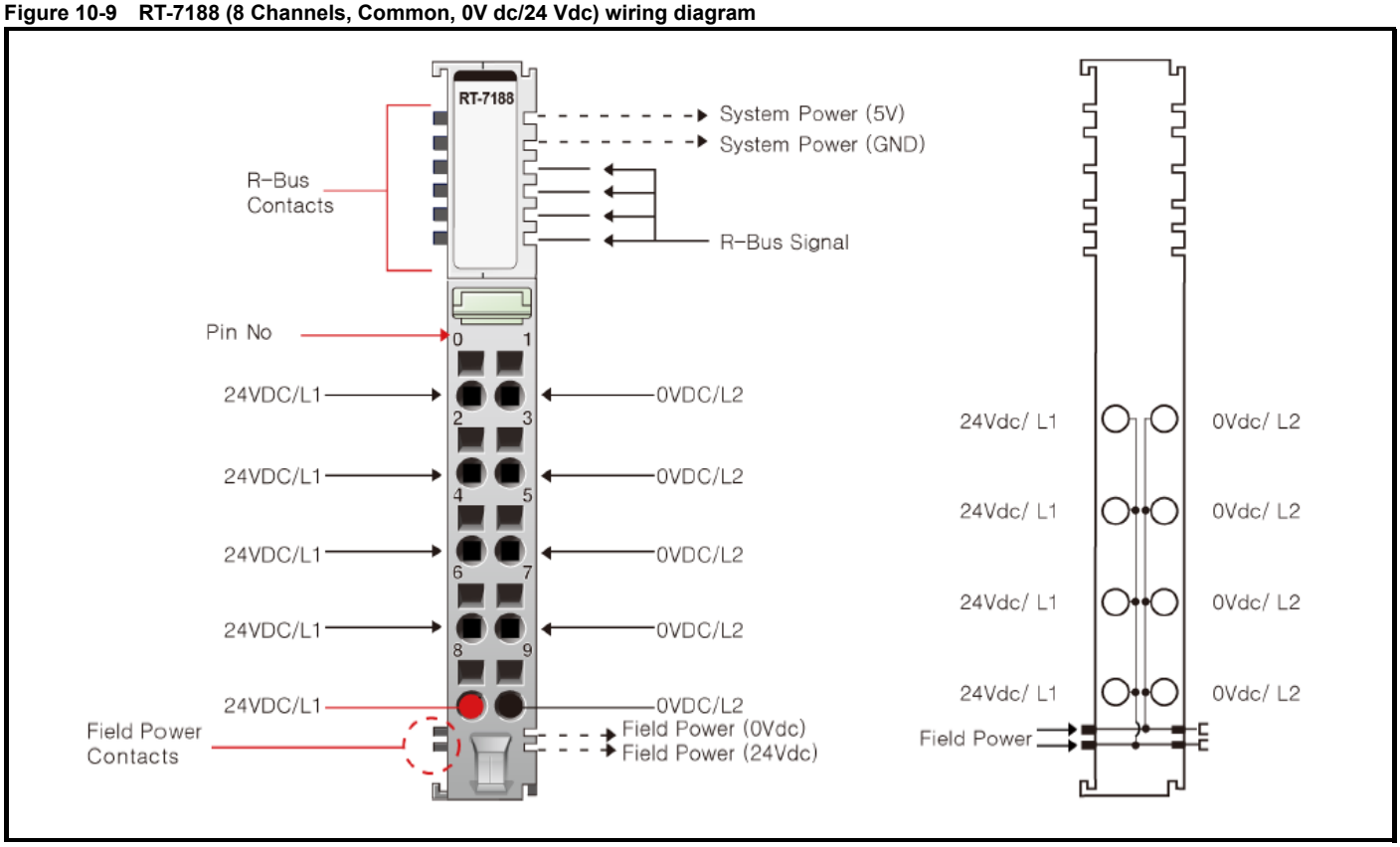
Figure 10-8 The RT-7118 provides 24 Vdc



Color	System Power	Field Power
Hole Number	0, 2	8, 9
Hole Number	1, 3	6, 7
Hole Number	4, 5 (F.G)	

10.13 RT-7188 (8 Channels, Common, 0V dc/24 Vdc)

Figure 10-9 RT-7188 (8 Channels, Common, 0V dc/24 Vdc) wiring diagram



Pin number	Signal description	Signal description	Pin number
0	24 Vdc/L1	0V dc/L2	1
2	24 Vdc/L1	0V dc/L2	3
4	24 Vdc/L1	0V dc/L2	5
6	24 Vdc/L1	0V dc/L2	7
8	24 Vdc/L1	0V dc/L2	9

Table 10-9 Environmental specification

Environmental specifications	
Operating temperature	-20 °C to 60 °C
Storage temperature	-40 °C to 85 °C
Relative humidity	5 % to 90 % non-condensing
Operating altitude	2000 m
Mounting	DIN rail
Input specification	
Field Power Voltage	-
Field Power Contacts Current	Max. 10 A
Indicators	No LED
R-Bus Power Contactor	Yes
General specifications	
Shock operating	IEC 60068-2-27
Vibration resistance	Sine Vibration (Based on IEC 60068-2-6) - • 5 to 25 Hz: ± 1.6 mm • 25 to 300 Hz: 4 g • Sweep Rate: 1 Oct/min, 20 Sweeps Random Vibration (Based on IEC 60068-2-64) • 10 to 40 Hz: 0.0125 g^2/ Hz • 40 to 100 Hz: 0.0125 → 0.002 g^2 /Hz • 100 to 500 Hz: 0.002 g^2/ Hz • 500 to 2000 Hz: 0.002 → 1.3 x 10-$^4g^2$/ Hz • Test time: 1 hr for each test
EMC resistance burst/ESD	EN 61000-6-2: 2005 EN 61000-6-4/A11: 2011
Installation Pos. / Protect. Class	Variable/IP20
Product certifications	UL
Wiring	I/O Cable Max. 2.0 mm^2 (AWG 14)
Weight	59 g
Module size	12 mm x 99 mm x 70 mm

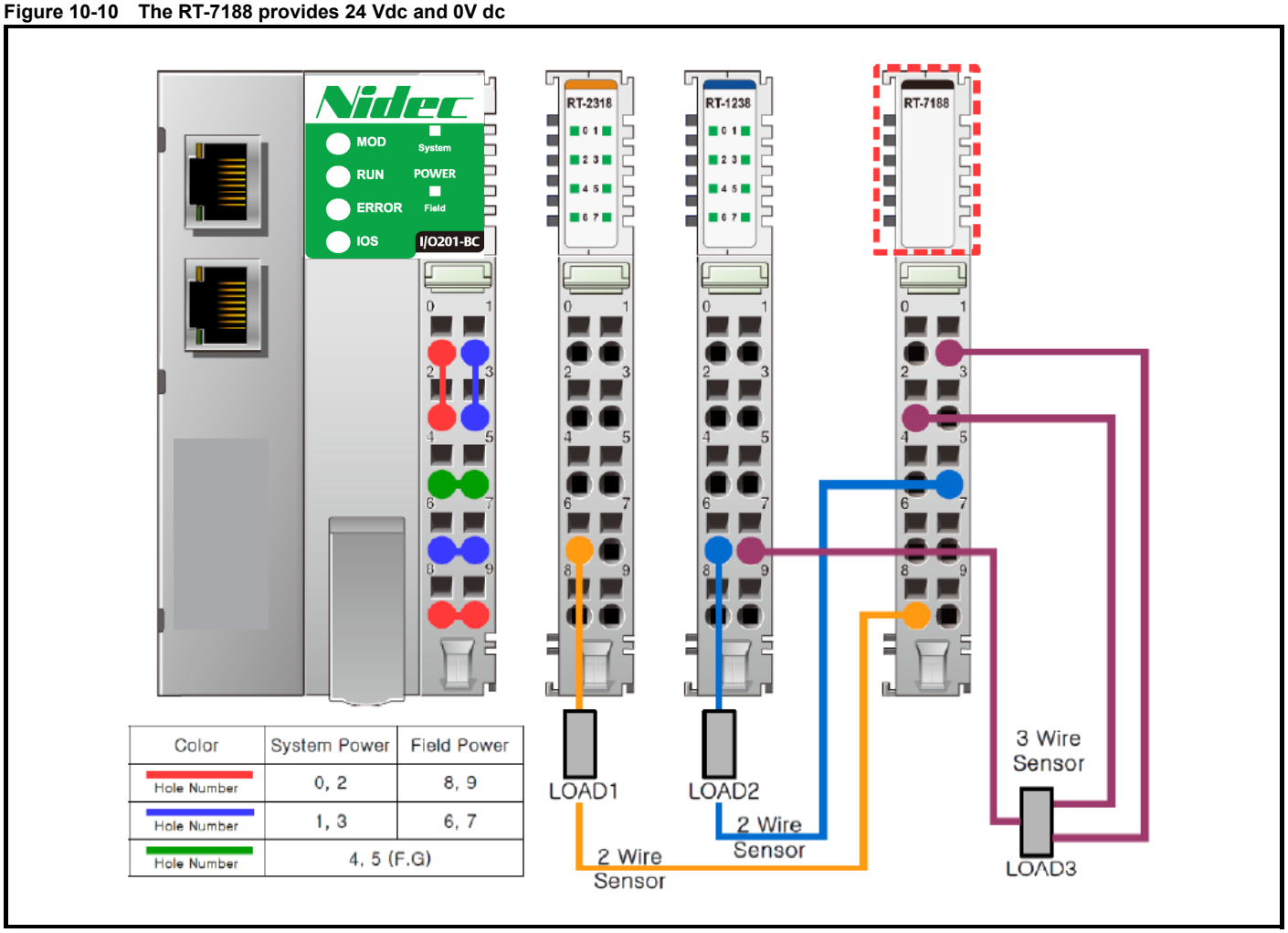
10.14 RT-7188 LED Indicator

10.14.1 LED Non Indicator

Module	LED number	LED function / description	LED colour
	LED	Non Indicator	N/A

10.15 RT-7188 example

Figure 10-10 The RT-7188 provides 24 Vdc and 0V dc



Color	System Power	Field Power
Hole Number	0, 2	8, 9
Hole Number	1, 3	6, 7
Hole Number	4, 5 (F.G)	

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0478-0279-02