

1 YEAR
WARRANTY

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User's Guide



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DRST-CM Communication Enabler



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GENERAL

WARNING

This device is designed for connection to hazardous electric voltages. Ignoring this warning can result in severe personal injury or mechanical damage.

To avoid the risk of electric shock and fire, the safety instructions of this guide must be observed and the guidelines followed. The specifications must not be exceeded, and the device must only be applied as described in the following.

Prior to the commissioning of the device, this installation guide must be examined carefully.

Only qualified personnel (technicians) should install this device.

If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

HAZARDOUS
VOLTAGE**WARNING**

Until the device is fixed, do not connect hazardous voltages to the device. The following operations should only be carried out on a disconnected device and under ESD safe conditions:

General mounting, connection and disconnection of Modbus cable.
Troubleshooting the device.



CAUTION

WARNING

Repair of the device must be done by Omega A/S only.

Section 1.2 - Symbol Identification



Triangle with an exclamation mark: Read the manual before installation and commissioning of the device in order to avoid incidents that could lead to personal injury or mechanical damage.



The CE mark proves the compliance of the device with the essential requirements of the directives.



The double insulation symbol shows that the device is protected by double or reinforced insulation.

Section 2 - Safety instructions

Receipt and unpacking

Unpack the device without damaging it and check whether the device type corresponds to the one ordered. The packing should always follow the device until this has been permanently mounted.

Environment

The device is manufactured for indoor use. Avoid direct sunlight, dust, high temperatures, mechanical vibrations and shock, as well as rain and heavy moisture. If necessary, heating in excess of the stated limits for ambient temperatures should be avoided by way of ventilation.

The device may be used in Overvoltage Category II, Pollution Degree 2 at an altitude up to 2000 m.

Mounting

Only qualified technicians who are familiar with the technical terms, warnings, and instructions in this installation guide and who are able to follow these should connect the device. Only devices which are undamaged and free of moist and dust may be installed. The device may be installed and supplied by Omega DRST series only.

Should there be any doubt as to the correct handling of the device, please contact your local distributor or, alternatively,

Calibration and Adjustment

During calibration and adjustment, the measuring and connection of external voltages must be carried out according to the specifications of this manual. The technician must use tools and instruments that are safe to use.

Cleaning

When disconnected, the device may be cleaned with a cloth moistened with distilled water.

IECEX, ATEX installation in Zone 2

IECEX DEK 13.0026 X Ex nA IIC T5 Gc

DEKRA 13ATEX0098 X II 3 G Ex nA IIC T5 Gc

For safe installation the following must be observed

The device must be installed by qualified personnel who are familiar with the national and international laws, directives and standards that apply to this area.

Year of manufacture can be taken from the first two digits in the serial number.

The devices must be installed in a suitable enclosure providing a degree of protection of at least IP54 according to EN60529, taking into account the environmental conditions under which the equipment will be used.

To prevent ignition of the explosive atmospheres do not separate connectors when energized and an explosive gas mixture is present.

To avoid the risk of explosion due to electrostatic charging of the enclosure, do not handle the units unless the area is known to be safe, or appropriate safety measures are taken to avoid electrostatic discharge.

Liability

To the extent the instructions in this manual are not strictly observed, the customer cannot advance a demand against Omega A/S that would otherwise exist according to the concluded sales agreement.

Section 3 - Communication Enabler

- Programming display for system DRST devices
- Modbus RTU protocol interface over RS485
- Monitor process value from the built-in display
- High 2.5 kV isolation to host unit
- Shielded RJ45 Modbus connector on top

Section 4 - Applications

- The DRST-CM detachable display adds Modbus RTU RS-485 serial communications to all current and future DRST units.
- The unit converts a wide array of sensors and analog device signals measured by the system DRST, like uni- and bipolar mA and voltage signals, potentiometer, Lin. R, RTD and TC, to a Modbus communication line signal.
- When mounted on a system DRST device any signal coming from or going to I.S. classified area, like AI, AO, DI and DO signals, can be converted to a Modbus network.
- All individual unit operating parameters can easily and quickly be configured by using the Modbus communication or by using the front display menu.
- The easily readable DRST-CM display can be used to read the process signal, simulate the output signal, indicate sensor errors and internal module errors.

Section 5 - Technical Characteristics

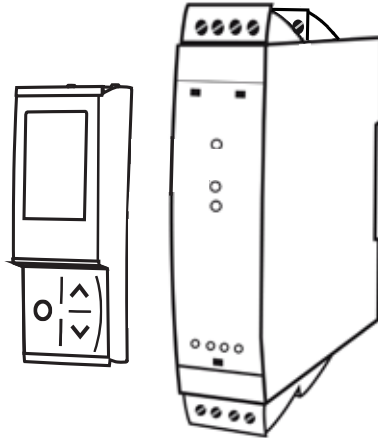
- DRST-CM has full DRSL-DISPLAY functionality for unit programming, process signal monitoring and diagnostics handling.
- Modbus RTU protocol is supported using a serial RS-485 communication wiring.
- Multidrop half-duplex connection via shielded RJ45 connector.
- High safe galvanic isolation of 2.5 kVAC between the serial wiring and the connected system DRST units.
- Modbus parameters such as address, baud rate, stop bit(s), and parity bit are configured from the DRST-CM display, which also stores parameters.

Section 6 - Mounting / Installation / Programming

- Mounting in Zone 2 / Div 2.
- The DRST-CM can be moved from one device to another. The individual system DRST unit configuration of the first transmitter can be saved and downloaded to subsequent transmitters.
- Programmed parameters can be protected by a user-defined password.
- When mounted on devices that are installed upside down, a menu item allows the display on the DRST-CM to be rotated 180° and the up/down buttons to switch function.

Section 7.1 - Mounting on a DRST device

DRST-CM is a detachable display that can be mounted on all DRST fronts for programming and signal monitoring.



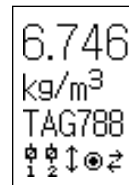
DRST-CM contains a four line LCD dot display

Line 1 can e.g. show the scaled process value.

Line 2 can e.g. show the selected engineering unit.

Line 3 can e.g. show the analog output or TAG no.

Line 4 shows status for communication and e.g. signal trending.

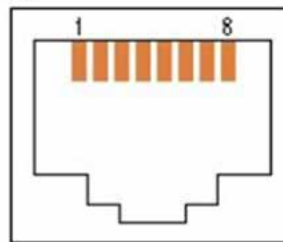


RJ45 Modbus Connector

Pin 5: RS485 A line

Pin 4: RS485 B line

Pin 8: RS485 GND and shield



Section 8 - Order

Type	Description
DRST-CM	Communication enabler
DRSL-DISPLAY	Configmate interface

Section 9 - Electrical specifications

Environmental conditions:

Specifications range	-20°C to +60°C
Storage temperature	-20°C to +85°C
Humidity	< 95% RH (non-cond.)
Protection degree	IP20
Installation in pollution degree 2 / overvoltage category II.	

Mechanical specifications:

Dimensions (H x W x D)	73.2 x 23.3 x 26.5 mm
Dimensions (H x W x D) w / DRST unit	109 x 23.5 x 131 mm
Weight approx.	100 g
Connection	RJ45 - shielded

Common specifications:

Power consumption	≤ 0.15 W
Isolation voltage - test / working	2.5 kVAC / 250 VAC reinforced isolation

Extended EMC immunity:	
NAMUR NE 21, A criterion, burst	No loss of communication

Signal / noise ratio.	> 60 dB
Update rate / response time	> 50 Hz / < 20 ms
Signal type.	RS-485 half duplex
Serial protocol.	Modbus RTU
Modbus mode.	RTU - slave
Devices on an RS485 line.	Up to 32 (without a repeater)
Data rates, baud.	2400, 4800, 9600, 19200, 38400, 57600, 115200
Automatic baudrate detection.	Yes - can be configured ON or OFF
Parity.	Even, Odd, None
Stop bit(s)	1 or 2
Digital addressing	1...247
Response delay	0...1000 ms

Approvals:

EMC 2004 / 108 / EC	EN 61326-1
LVD 2006 / 95 / EC	EN 61010-1
UL, Standard for Safety	UL 61010-1

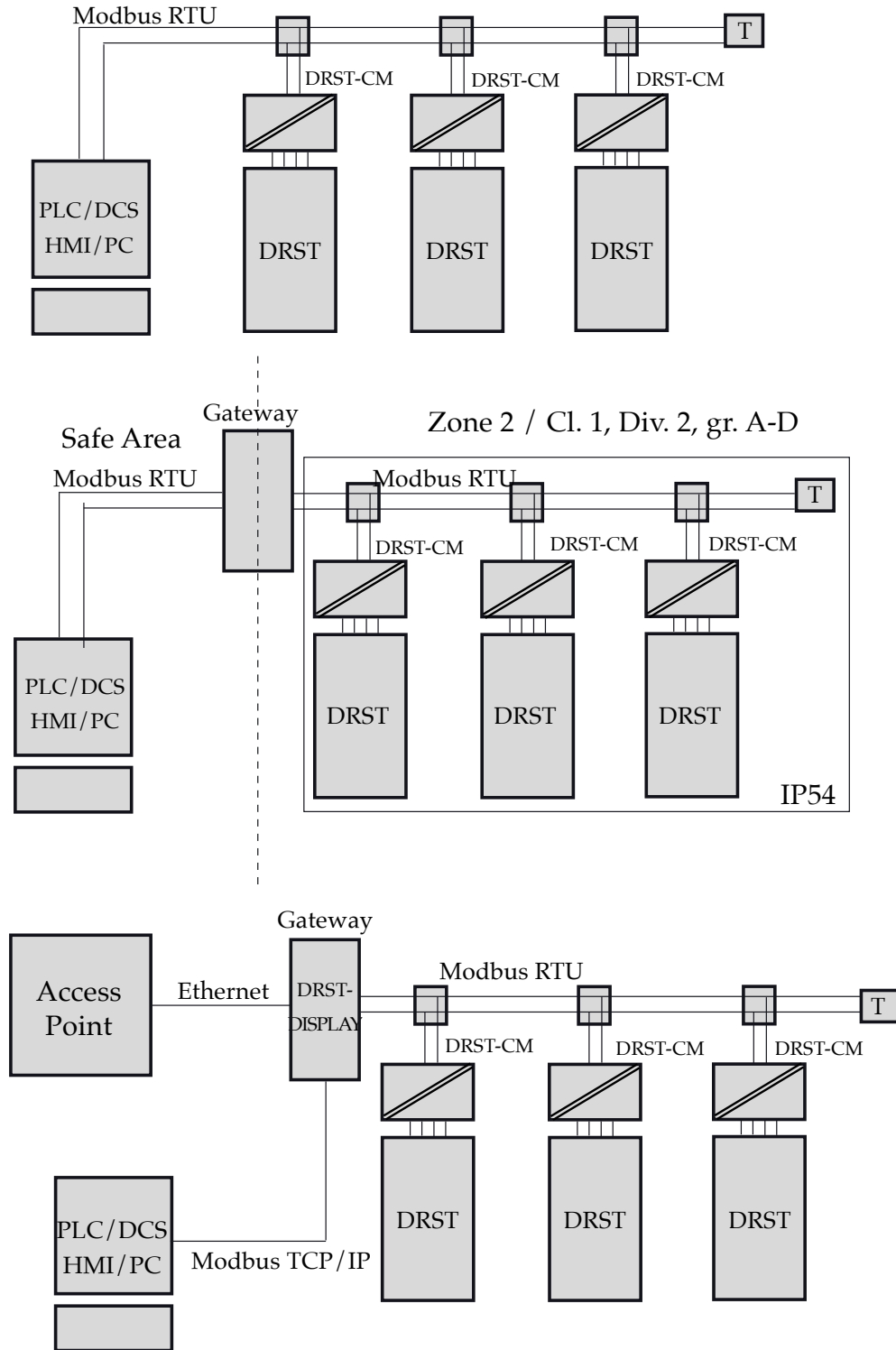
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Ex:

ATEX.	DEKRA 13ATEX0098 X II 3 G Ex nA IIC T5 Gc
IECEX	DEK 13.0026 X Ex nA IIC T5 Gc
FM	0003049132-C CL I DIV2 GP A- D T5 CL I Zn2 Groups IIC T5 CL I Zn2 AEx / Ex nA IIC T5

Section 9 - Electrical Specification



Section 10 - Modbus Basics

Modbus is a “master-slave” system..., where the “master” communicates with one or multiple “slaves”.

The master typically is a PLC (Programmable Logic Controller), DCS (Distributed Control System), HMI (Human Machine Interface), RTU (Remote Terminal Unit) or PC.

The three most common Modbus versions used are: MODBUS ASCII, MODBUS RTU and MODBUS/TCP.

In Modbus RTU, data is coded in binary, and requires only one communication byte per data byte. This is ideal for use over multi-drop RS485 networks, at speeds up to 115,200 bps.

The most common speeds are 9,600 bps and 19,200 bps.

Modbus RTU is the most widely used industrial protocol and is supported by the DRST-CM.

Modbus RTU:

To communicate with a slave device, the master sends a message containing:

Device Address - Function Code - Data - Error Check

The Device Address is a number from 0 to 247.

Messages sent to address 0 (broadcast messages) will be accepted by all slaves, but numbers 1-247 are addresses of specific devices.

With the exception of broadcast messages, a slave device always responds to a Modbus message so the master knows the message was received.

Command	Function code
Read Holding Registers	03
Read Input Registers	04
Write Single Register	06
Diagnostics	08
Write Multiple Registers	16

DRST-CM Supported Modbus Function Codes:

The Function Code defines the command that the slave device is to execute, such as read data, accept data, report status. Some function codes have subfunction codes.

The Data defines addresses in the device’s memory map for read functions, contains data values to be written into the device’s memory, or contains other information needed to carry out the function requested.

The Error Check is a 16-bit numeric value representing the Cyclic Redundancy Check (CRC).

Maximum number of registers which can be read or written at once:

For a read command, the limit is 8 registers at a baud rate up to 38,400 bps, 16 registers @ 57,800 bps and 32 registers @ 115,200 bps.

For a write command, the limit is 123 registers at baud rates up to 115,200 bps.

DRST-CM Modbus parameter settings

Automatic Baudrate Detection:

Can be configured YES or NO

Supported baudrates:

2400, 4800, 9600, 19.2k, 38.4k, 57.6k, 115.2k bps

Parity Mode:

Even, Odd or None parity

Stop Bits:

1 or 2 stop bits

Response delay:

0...1000 ms (**0 ms = default**)

Modbus slave addressing range:

1 - 247 (**247 = default address**)

Modbus Parameter Storage:

Saved in non-volatile memory in the DRST-CM device (Factory Default Values are marked in bold)

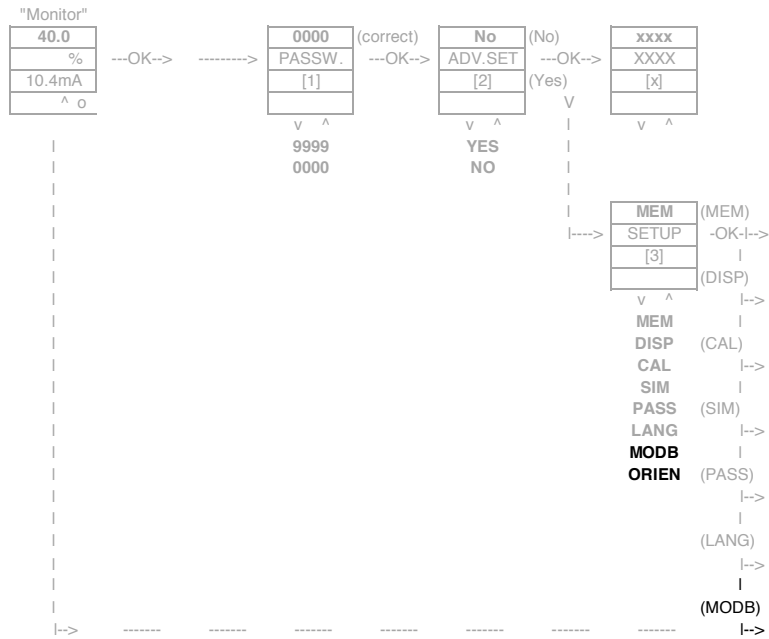
Modbus RTU segment line termination:

A 120 Ohm resistor should be installed on both ends of a RS485 Modbus RTU segment loop to prevent signal echoes from corrupting data on the line.

DRST-CM Modbus settings - Routing Diagram

DRST-CM local subm

V0R9



SCROLLING HELPTXTS:

- [1] Set correct password
- [2] Enter advanced setup menu?
- [3] Enter Language setup
Enter Password setup
Enter Simulation mode
Perform Process calibration
Enter Display setup
Perform Memory operations
Enter Modbus setup
Enter Rotation setup
- [4] Enable modbus communication
Disable Modbus communication
See automatic baudrate detection status
- [5] Reset Modbus to default?
- [6] Select Modbus slave address
- [7] Select parity for Modbus
- [8] Select number of stop bits
- [9] Select response delay in ms
- [10] Enable automatic baudrate detection
- [11] Modbus baudrate not detected
Searching for Modbus baudrate
Modbus baudrate detected
- [12] Select baudrate in bps
- [13] Rotate device upside down?

!!! Returns to "Monitor" from any menu, after 1 min with no keypress.
!!! Returns to "Monitor" upon succesful Modbus write command.

The gray shaded menus/texts are only shown for guidance, and are not part of the DRST-CM specific submenu.
The Modbus submenu is located somewhere in the menu structure of any host device supporting DRST-CM. The actual place is defined for each particular device.

*1)
Only if automatic baudrate detection is enabled

WARRANTY/DISCLAIMER

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of **13 months** from date of purchase. OMEGA's WARRANTY adds an additional one (1) month grace period to the normal **one (1) year product warranty** to cover handling and shipping time. This ensures that OMEGA's customers receive maximum coverage on each product.

If the unit malfunctions, it must be returned to the factory for evaluation. OMEGA's Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective, it will be repaired or replaced at no charge. OMEGA's WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of having been damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of OMEGA's control. Components in which wear is not warranted, include but are not limited to contact points, fuses, and triacs.

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RETURN REQUESTS/INQUIRIES

Direct all warranty and repair requests/inquiries to the OMEGA Customer Service Department. BEFORE RETURNING ANY PRODUCT(S) TO OMEGA, PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM OMEGA'S CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS). The assigned AR number should then be marked on the outside of the return package and on any correspondence.

The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit.

FOR **WARRANTY** RETURNS, please have the following information available BEFORE contacting OMEGA:

1. Purchase Order number under which the product was PURCHASED,
2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product.

FOR **NON-WARRANTY** REPAIRS, consult OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA:

1. Purchase Order number to cover the COST of the repair,
2. Model and serial number of the product, and
3. Repair instructions and/or specific problems relative to the product.

OMEGA's policy is to make running changes, not model changes, whenever an improvement is possible. This affords our customers the latest in technology and engineering.

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