mecc alte

POWER FROM WITHIN

DIVIT CONTROLLER

SMARTECH

A DIVISION OF MECC ALTE

USER MANUAL


DIVIT
ALARM
ALARM
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J5
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1. GENERAL CHARACTERISTICS

The DIVIT device acquires voltage or current signals on four different channels galvanically isolated from each other and the power lines. They can be used with 0..5V or 0..10V voltage signals, or in 0..10 or 0..20mA current loop. Each independent channel can be associated with a reading magnitude by setting appropriate parameters for the corresponding measured electric/magnitude signal values of two known characteristic points; correspondence should be linear. The value of the measured magnitude is transmitted directly. The format of the data transmitted has an absolute dynamic ranging from -273 to +1735 with selectable decimal point position. A descriptive alphanumeric string can be set for each channel on the Mecc Alte DST4601/PX boards, and the unit of measure of the magnitude measured by the sensor defined in it. Both active and passive sensors can be used.

The device is available in two versions, with CANBUS or MODBUS RS485 communication; both versions have galvanically isolated communication lines. A further (non isolated) RS232 connection is available via Jack to configure the device. Connection with Mecc Alte boards is via CANBUS, with dedicated EX-BUS protocol.

The device has an output connector for controlling the optional Mecc Alte E610209350XXX, DITEL MODULE 8 OUTPUTS, either at 12V or 24V. Through it you can control eight dry contact relay outputs, activated through thresholds and conditions set with parameters using an RS232 serial port (JP connector) and the Mecc Alte BoardPrg program.

The device can be installed on a DIN guide.

1.1 VERSIONS AVAILABLE

E610209400xx	**DIVIT CANBUS** (isolated CAN BUS + non-isolated RS232 via jack connector) Designed to be used with DST4601/PX devices with CANBUS connection; up to 16 modules with Mecc Alte EX-BUS proprietary protocol can be connected.
E610209410xx	**DIGRIN MODBUS RS485** (Isolated RS485 + non-isolated RS232 with jack connector used only for configuration). For use with devices using MODBUS RTU protocol with RS485 connection: 32 possible addresses.

2. TECHNICAL SPECIFICATIONS

Input voltage	7÷32VDC
Current absorbed	100 mA (@ 13V)
Consumption	Max. 2.4 W
Isolation of input reading channels	1000 V
Live inputs	monopolar; two scales: 0.. 5V 0..10V input impedance 1Mohm
Current inputs	monopolar; two scales: 0..10mA 0..20mA Input impedance < 10ohm
Max. input voltage	25V
Maximum input current	30mA

Readings	
Precision (with reference to f.s.)	0.05%
Linearity	0.05%
Thermal drift (with reference to f.s.)	0.01%/K
Response time (CAN signal)	400 ms
Digital acquisition resolution	15 bit
Reading resolution	1/32
Display resolution (on DST4601/PX)	1/10
Reading dynamics transmitted	From -273 to +1735 units with one decimal figure; position of decimal point position can be set

Environmental conditions	
Operating temperature:	from -20°C to +60°C
Humidity:	from 30 to 90% condensate-free
Storage temperature:	from -20°C to +70°C
Degree of protection	IP 20

Dimensions/Weight			
Dimensions:	101Hx35Lx119D	**Weight:**	165 g

Connections
J1 VDC power supply
J6, **J7**, **J8, J9** input signals
JP 3.5 mm jack RS232 for parameter configuration.
J2 connection with galvanic isolation RS485 or CANbus.
J5 connection to 8 relay board (flat cable)

2.1 INDICATORS

LED	Description
ON WORK	Running LED (flashes to indicate the device is on)
REMOTE	Indicates the state of the main communication interface. For can bus version: LED flashing = no communication (bus off or passive error), LED on = Can communication active (Active error). For RS485 version: LED off = no communication, LED on = communication active.
ALARM 1	Signals on channel 1 (see table below)
ALARM 2	Signals on channel 2 (see table below)
ALARM 3	Signals on channel 3 (see table below)
ALARM 4	Signals on channel 3 (see table below)

LED sequence - ALARM 1, 2, 3, 4	Meaning
Off	No signal (valid reading, no condition active on relevant input, or input not configured)
1 rapid flash	Differential Reading function activated (only on IN3, indicates that it is not a real measurement but the difference between Reading 2 - Reading 1).
50% alternate blinking	Invalid reading or out of range, sensor failure
Lit fixed	Condition verified on relevant input (if configured, corresponding OUT will be activated)

3. MODBUS SPECIFICATIONS

Protocol: **Rtu Modbus**

Two baud rates can be selected with switches: **9600 / 19200**

Transm. parameters: **N, 8, 1** fixed

Modbus address selectable with SWN switch: **1-32** (RS485 version), **1-16** (CANBUS version)

Connection via standard J1939 or PMC bus owner.

Not compatible with protocol-MTU MDEC

N.B.: register writing is protected (SWN-8=OFF → protection active, cannot write).

Modbus Registers - Input Register		Format
30001	Conv. points 1	16 bit with sign (range from -32768 to +32767)
30002	Conv. points 2	
30003	Conv. points 3	
30004	Conv. points 4	
30015	SWN switch on start-up and current	8 high bits = power on start-up, 8 low bits = current switch position. 0=OFF, 1=ON
30016	Outputs used in conditions	Bit 0 = OUT 1, bit 1= OUT2 , ... (0=free, 1=used)
30018	Digital outputs module diagnostics	0 = OK, module connected and functioning 1 = Transmission Error (TER) 2 = OL OpenLoad Error (OUT module disconnected) 4 = Diagnosis error (Overload, or Overtemperature)
30019	Test Flag	0 = normal operation, 1 = testing board
30020	ALARM1,2,3,4 LED state	2 bits for each LED (00 = off, 01 = 50% flashing, 10 = 20% flashing, 11 = lit)
30021 x2	Reading 1 a 32-bit	32 bit format with sign 3 decimal places (the reading should be divided by 1000). Range : from -2,147,483.648 to 2,147,483.647. If sensor fails or is outside limits - will count 0.
30023 x2	Reading 2 at 32 bit	
30025 x2	Reading 3 at 32 bit	
30027 x2	Reading 4 at 32 bit	
30031	Reading 1 – Ex-Bus format	Ex-Bus format (16 bit): Offset = -273 5 decimal bits (divide by 32) Valid values = 0x0000 - 0xFAFE (from -273 to 1734.94°C) Diagnostic values: 0xFAFF = Overflow, 0x0000=Underflow 0xFF00 = unavailable, 0xFE03 = voltage over threshold 0xFE04 = voltage under threshold 0xFE05 = current under threshold 0xFE06 = current over threshold
30032	Reading 2 – Ex-Bus format	
30033	Reading 3 – Ex-Bus format	
30034	Reading 4 – Ex-Bus format	
30041	Current calculated on input 1	In microamps (16 bit with sign)
30042	Current calculated on input 2	In microamps (16 bit with sign)
30043	Current calculated on input 3	In microamps (16 bit with sign)
30044	Current calculated on input 4	In microamps (16 bit with sign)
30051	Voltage calculated on input 1	In millivolts (16 bit with sign)
30052	Voltage calculated on input 2	In millivolts (16 bit with sign)
30053	Voltage calculated on input 3	In millivolts (16 bit with sign)
30054	Voltage calculated on input 4	In millivolts (16 bit with sign)
30085	Reading validity from input 1	0 = Reading valid 1 = Input not configured, Reading unavailable 2 = Reading invalid
30086	Reading validity from input 2	
30087	Reading validity from input 3	
30088	Reading validity from input 4	
30089	OUT state on relay 8 module	bit 0 – OUT 1, bit 1 – OUT 2, ... 0=OFF 1=ON
30201	Presence of CANBUS interface	1 = interface present, 0 = not present
30202	CANBUS state	0 = Error Active, 1 = Error Passive, 2 = BusOff

Modbus Registers - Holding Register			Format
40015	Input 1 configuration		0 = None 1 = 0-10 mA 2 = 0-20 mA 3 = 0-5V 4 = 0-10 V
40016	Input 2 configuration		
40017	Input 3 configuration		
40018	Input 4 configuration		
40019	Differential reading function activation		0 = Off, 1 = On (Reading 3 = Reading 2 - Reading 1)
40021 x2	Reading 1. Input Value 1		Expressed in microA or mV
40023 x2	Reading 1. Input Value 2.		Expressed in microA or mV
40025 x2	Reading 1. Value 1 corresponding transm.		Any m.u.
40027 x2	Reading 1. Value 2 corresponding transm.		Any m.u.
40031 x2	Reading 2. Input Value 1		Expressed in microA or mV
40033 x2	Reading 2. Input Value 2.		Expressed in microA or mV
40035 x2	Reading 2. Value 1 corresponding transm.		Any m.u.
40037 x2	Reading 2. Value 2 corresponding transm.		Any m.u.
40041 x2	Reading 3. Input Value 1		Expressed in microA or mV
40043 x2	Reading 3. Input Value 2.		Expressed in microA or mV
40045 x2	Reading 3. Value 1 corresponding transm.		Any m.u.
40047 x2	Reading 3. Value 2 corresponding transm.		Any m.u.
40051 x2	Reading 4. Input Value 1		Expressed in microA or mV
40053 x2	Reading 4. Input Value 2.		Expressed in microA or mV
40055 x2	Reading 4. Value 1 corresponding transm.		Any m.u.
40057 x2	Reading 4. Value 2 corresponding transm.		Any m.u.
40061	Low threshold (%) for sensor 1 failure		Format: 16 bit with sign, 8 decimal bits (divide by 256) Value -1 indicates control disabled.
40062	High threshold (%) for sensor 1 failure		
40063	Low threshold (%) for sensor 2 failure		
40064	High threshold (%) for sensor 2 failure		
40065	Low threshold (%) for sensor 3 failure		
40066	High threshold (%) for sensor 3 failure		
40067	Low threshold (%) for sensor 4 failure		
40068	High threshold (%) for sensor 4 failure		
40501	Relay outputs control		Writing modifies the outputs not used in the conditions .. Reading only indicates the outputs controlled via Modbus, but not the actual state of the outputs.
	8 Conditions		
43001 + Nx10		Condition N - N. Analog Input	0 = condition disabled, 1= IN1, 2=IN2, 3=IN3, 4=IN4
43002 + Nx10		Condition N - N. relay output	0= no OUT, 1 =OUT1, 2=OUT2, ..., 8=OUT8
43003 + Nx10		Condition N - Activation threshold	
43004 + Nx10		Condition N - Activation delay	Format: tenths of a sec. 0 = disab. threshold.
43005 + Nx10		Condition N - Deactivation threshold	
43006 + Nx10		Condition N - Deactivation delay	Format: tenths of a sec. 0 = disab. threshold.
43008 + Nx10		Condition N - And/Or operation on same OUT	0=Or, 1=And
43009 + Nx10		Condition N - OUT state on invalid reading	0 = not forced, 1 = OFF 2 = ON

4. CanBus specifications (EX-BUS proprietary protocol)

CAN speed: **250 kbit/s**

CAN settings: **sample point at 75%, 11bit identifier (standard format)**

Messages transmitted EX-BUS:

ID	MIX	L. data	Description
0x430 – 0x43F	MXD-DIVIT	8 byte	Data: contains the 4 analog readings acquired. 16 bit for each reading. Transmission freq.: 400 msec Ex-Bus format: valid values from 0x0000 to 0xFAFF Reading value = [(Ex-bus value) / 32] - 273 From 0xFB00 to 0xFFFF diagnostic values: 0xFAFF = Overflow, 0x0000 = Underflow, 0xFF00 = unavailable, 0xFE03 = voltage over threshold 0xFE04 = voltage under threshold 0xFE05 = current under threshold 0xFE06 = current over threshold
0x430 – 0x43F	MXS-DIVIT	6 byte	**Diagnostics**. Contains: board type, firmware revision, CAN error counters, alarm states. Transmission freq.: 1 sec.

Note: each module transmits with a single ID. The ID selection is made with SWN switches 1-4 (EX-BUS ADDRESS). To change the EX-BUS address, after modifying the switches, turn the DIVIT module off then on again.

For further information on EX-BUS protocol, refer to EAAS0346xxxx specifications.

5. Differential reading

Enabling this function lets you automatically calculate and transmit the difference between the readings acquired from input 1 and input 2 (then M3 = M2 - M1). In this case the sensor connected to input 3 (J7) will not be detected.

ALARM3 Led flashes rapidly to indicate the function is activated and the reading is estimated. The result of the difference is taken as a normal reading, so it is transmitted instead of the reading from input 3 and can be associated with conditions and thresholds. If inputs 1 or 2 are invalid, M3 will also be invalid. This function is activated by parameter.

6. Conditions

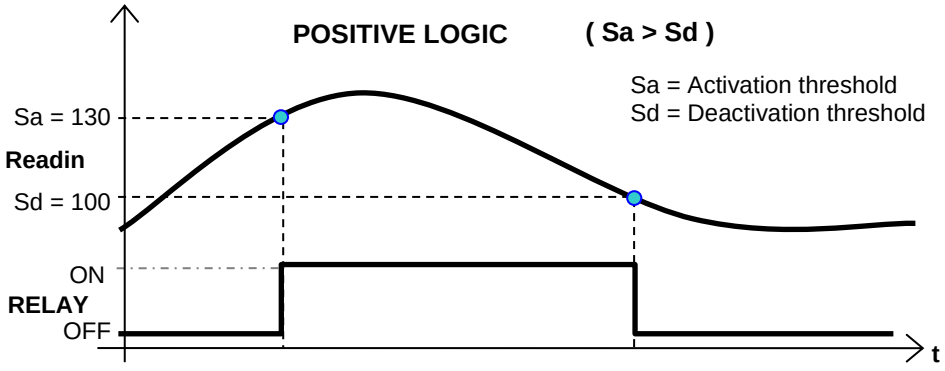
The conditions allow flexible programming of the thresholds for activation of the relays. Parameter can be set for up to 8 conditions. You can associate 2 or more conditions by setting the same OUT and indicating whether they operate with OR or AND logic.

The following can be set for each condition:

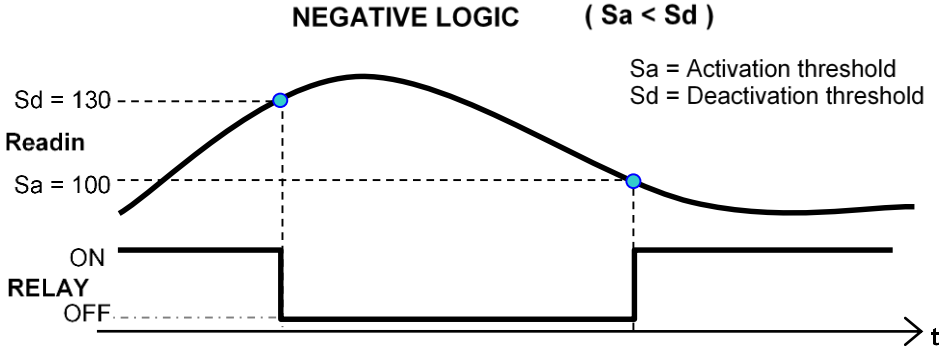
- **Input N.**: if set to 0 deactivates the entire condition, from 1 to 4 selects the analog input to take the reading from for the control.
- **Out N.**: if 0 no OUT is modified by this condition, the value from 1 to 8 selects the relay output to use (if the condition is verified, this output will be activated, otherwise it will be deactivated). Note: the OUT is under the full control of the condition and cannot be modified via Modbus.
- **Activation threshold and delay**: When the measured value exceeds this threshold for the time indicated, the condition is activated (positive logic).
- **Deactivation threshold and delay**: When the reading value falls below this threshold, and remains so for the time indicated, the condition is deactivated (in positive logic). If the delay is 0, the deactivation threshold is disabled: in this case the condition is disabled when the value drops below the activation threshold.
- **OUT state on reading invalid or sensor fault**. If the input selected by this condition is outside the declared limits or the reading is invalid, this parameter indicates the state the output must be in: 0= not forced, 1= forced deactivated (OFF), 2= forced activated (ON).
- **And/or logic** on previous conditions that use the same OUT.

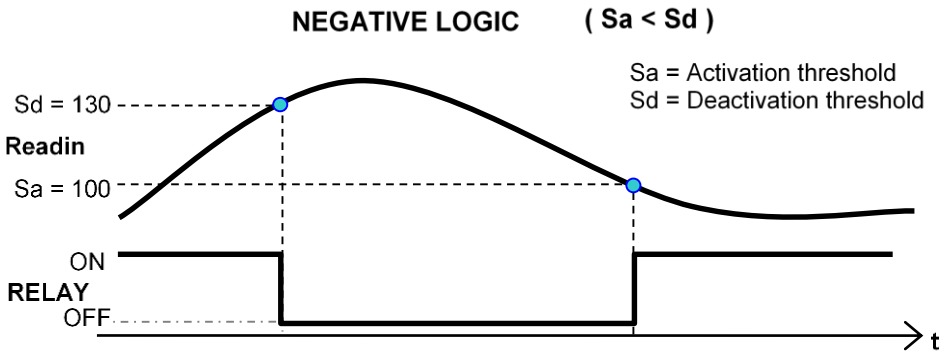
The thresholds can function in positive or negative logic:

POSITIVE LOGIC: activation threshold >= deactivation threshold (e.g.: activation threshold = 8.5 Bar, deactivation threshold = 8.0 Bar → the relay is normally open; when the pressure reaches 8.5 bar the relay is closed, and remains so until the pressure drops below 8.0 bar again).



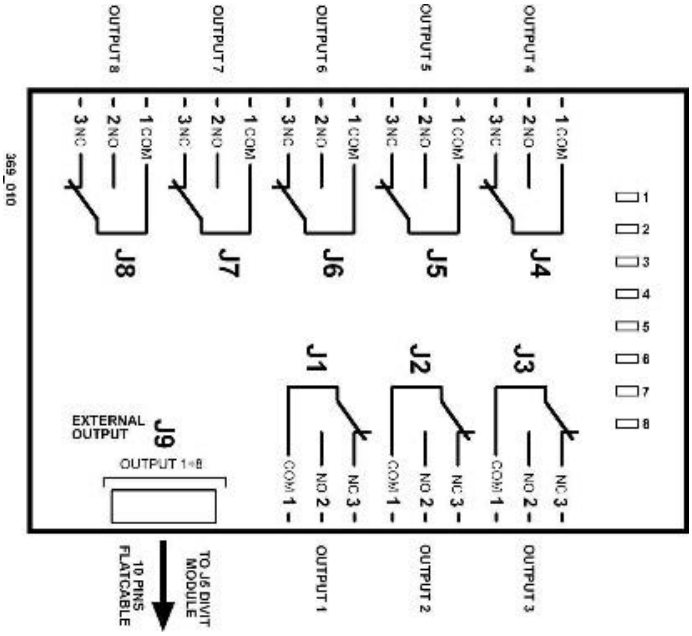
NEGATIVE LOGIC: activation threshold < deactivation threshold (e.g. activation threshold = 20%, deactivation threshold = 50% → the relay remains closed as long as the percentage reading is below 20%. The relay opens when the reading is above 20% and remains open until the percentage drops below 50%)





7. Using with 8 out relay board

8 RELAY MODULE
Max. current rating of relays: **4A**.
Weight of 8 relay module: 150 g



The 8 out relay board doers not require a power input; it should be connected to the DIVIT module using a 10-pin flat cable connected to connector J5. Position the two modules so the flat cable is as short as possible.

Each output has an indicator LED. The leds light when the corresponding output is active, in other words when the contact closes between **COM** and **NO**.

The outputs can be controlled by the conditions set in the parameter, or via Modbus. The out controlled by the conditions cannot be modified via Modbus.

8 relay module version available:

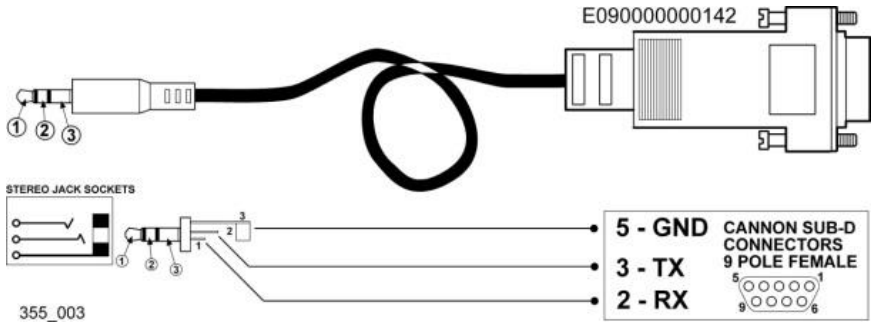
E610209350000	**8 OUTPUTS 24V MODULE.** For systems with 24V (18-30 VDC) power supply
E610209350100	**8 OUTPUTS 12V MODULE.** For systems with 12V (9-16 VDC) power supply

8. Configuration

The configuration requires connection to a PC via RS232 serial port using Jack connector **JP** or RS485 serial with connector **J2** and the BoardPrg program (version 2.25 and later).

The Mecc Alte Board Programmer4 PC Software (hereinafter called "BoardPrg4"), can be downloaded for free from the Mecc Alte website www.meccalte.com . In the Software section → Mecc Alte BoardPrg4 (select the latest version BoardPrg_x_yy_z.msi).

Notes: Use cable E090000000142 (RS232-E20931 module connection cable) to connect via a RS232 serial port (JP Jack connector).



- Set the serial port to be used on the PC (in **Communication Menu → Select Communication Resource**). Check the communication parameters: **9600, N, 8, 1**
- Set the **Modbus** address (in **Communication→ menu - Serial address**: default = 1)
- Display the parameter window (in **File menu → Parameter management**)
- Make the connection to the **DIVIT** board (**Connect**).

Important: Read the parameters (Read command), and transfer the values to the New Value column, where you can edit them (Copy command).

Now you can configure the device.

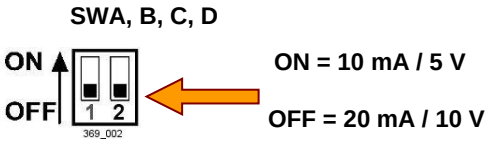
After configuration, check **SWE dipswitch 8=ON** and press **Transmit**.

The configuration can be saved on a **PC** (Save), and reloaded (Load) at a later date to configure other modules in the same way.

After programming, switch SWE dipswitch 8 OFF again to activate write protection.

8.1 Select type of reading and end-of-scale

SWA, SWB, SWC and SWD switches 1 set the end-of-scale for each channel, switches 2 are not used:



Once you have set the switches, adjust the parameters.

By default, no channel is enabled and none of the four readings is transmitted.

Set the type of electrical signal (current or voltage) and its end-of-scale value for each channel used. Select in the drop down menu under "Input type" in the pages of the 4 inputs of the BoardPrg program.

You can set the limits of acceptability of the signals from the sensors: these are the lower and upper thresholds for reporting sensor faults. Values are expressed as a percentage and refer to the current or voltage reading. E.g.: if we have a 4-20 mA signal, the input will be configured for 0-20 mA; we can set 20% as the lower threshold and 100% as the upper threshold so if the sensor signal is below 4 mA or above 20 mA a fault will be reported (sensor faulty or disconnected).

8.2 Setting the electrical sensors-signals correspondence

Independently for each channel you can set the correspondence between the electrical magnitudes (current and/or voltage) at the module inputs and the physical magnitudes (pressure, speed, levels ...) detected by sensors or other devices. We need to know two points on the sensors characteristics, which must be linear. The configuration parameters can be found in the inputs pages. Enter the value of physical magnitude and the corresponding electrical signal for each channel.

For example, if on channel 1 there is a pressure sensor for which the points 2 and 8 bar correspond to 6 and 10mA are known, enter the value 6 in the "Input value 1" box and value 2 in the box "Corresponding value 1 transmitted". Then enter values 10 in the "Input Value 2" box and 8 in the "Corresponding value 2 transmitted" box. The channel has now been configured.

The maximum limit of the transmitted value is 1735 units; using values with decimals and choosing multiples or sub-multiples of the unit of measure of the input magnitude, any value can be transmitted.

For example, to transmit a pressure from 1000Pa to 7000Pa choose the "corresponding values transmitted" 100.0 and 700.0 hPa (hectopascals) as the unit of measure.

8.3 Switch settings

8.3.1 SWN switches for RS485 Version

SWN SWITCHES	Description
1- 5	Assign modbus device address (from 1 to 32) with SW6 = ON
6	Modbus address block: ON = from switches 1-5, OFF=1 fixed
7	Not used
8	ON = enable parameter writing

Modbus address allocation table

SWN DIPSWITCHES	MODBUS ADDRESS																													
	ON	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
	5																	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	4									x	x	x	x	x	x	x	x									x	x	x	x	x	x	x	X
	3					x	x	x	x					x	x	x	x					x	x	x	x					x	x	x	X
	2			x	x			x	x			x	x			x	x			x	x			x	x			x	x			x	X
	1		x		x		x		x		x		x		x		x		x		x		x		x		x		x		x		X

8.3.2 SWN switches for CanBus Version

SWN SWITCHES	Description	
1	EX-BUS	Jack JP Modbus
2	ID EX-BUS (from 0x430 to 0x43F)	Modbus device address assigned from 1 to 16 (if SWN 6=ON)
3		
4		
5	Not used	
6	Modbus address block: ON = selected with switches 1-4, OFF = 1 fixed	
7	Not used	
8	ON = enable parameter writing	

EX-BUS address assignment table

SWN DIPSWITCHES	EX-BUS ADDRESS																
	ON	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	4									x	x	x	x	x	x	x	x
	3					x	x	x	x					x	x	x	x
	2			x	x			x	x			x	x			x	x
	1		x		x		x		x		x		x		x		x

8.3.3 JP serial interface configuration switch

SWP SWITCH	ON	OFF
1	Insert the 120Ω compensation resistor in RS485 line	Remove the 120Ω compensation resistor from the RS485 line
2	Disable RS232/RS485 serial JP	Enable RS232/RS485 serial JP
3	Enable RS232 serial (JP)	Enable RS485 serial (JP)
4	Baud rate = 19200	Baud rate = 9600

9. Installation instructions

The device is designed to be mounted on a DIN 46277 guide in an upright position. It requires adequate ventilation to function properly. Avoid installing above and/or near devices that produce heat.

Only use screened cable to connect to the reading inputs; connect the screen at a ground point near the input connectors.

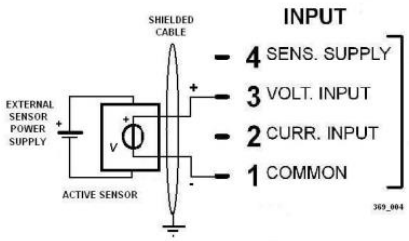
For an RS485 connection, use a screened cable with an 120 ohm impedance; for CANBUS connection, use the appropriate cable, e.g. KELUKABEL 800571

RS485/CANBUS terminations: to minimize reflections, the first and last device in the RS485 or CANBUS network must have a termination resistor connected in parallel with the **120 ohm ½ W** line.

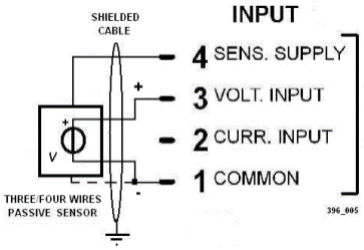
10. Sensor connections

10.1 Voltage input

active sensor

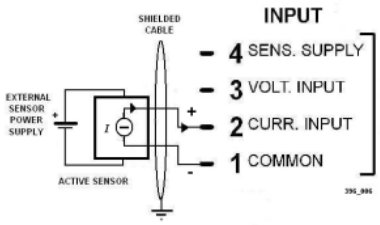


3/4-wire passive sensor

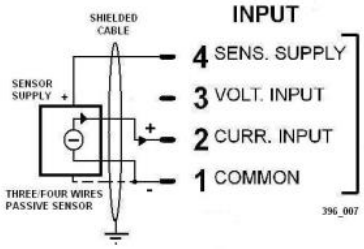


10.2 Current Input

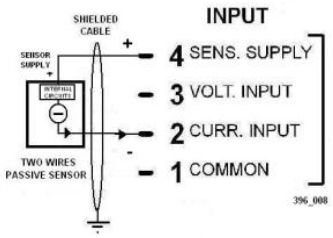
active sensor:



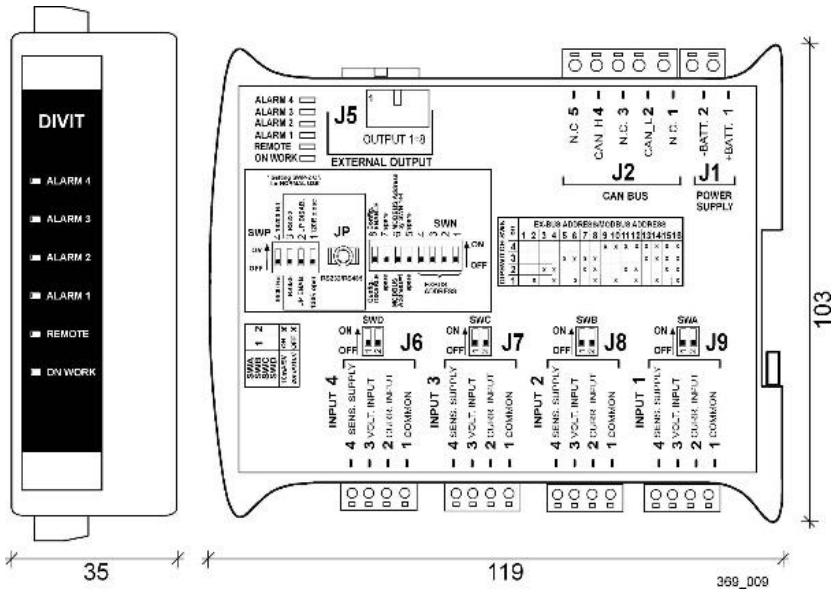
3/4-wire passive sensor



passive 2-wire sensor:

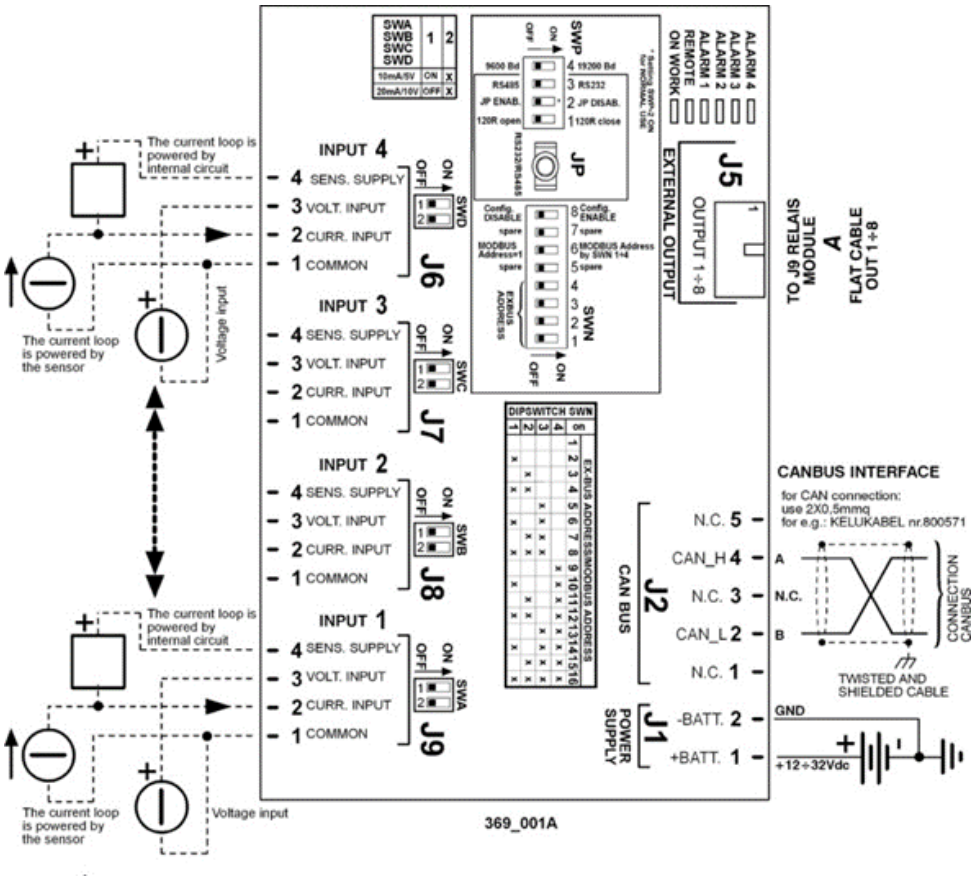


11. Dimensions

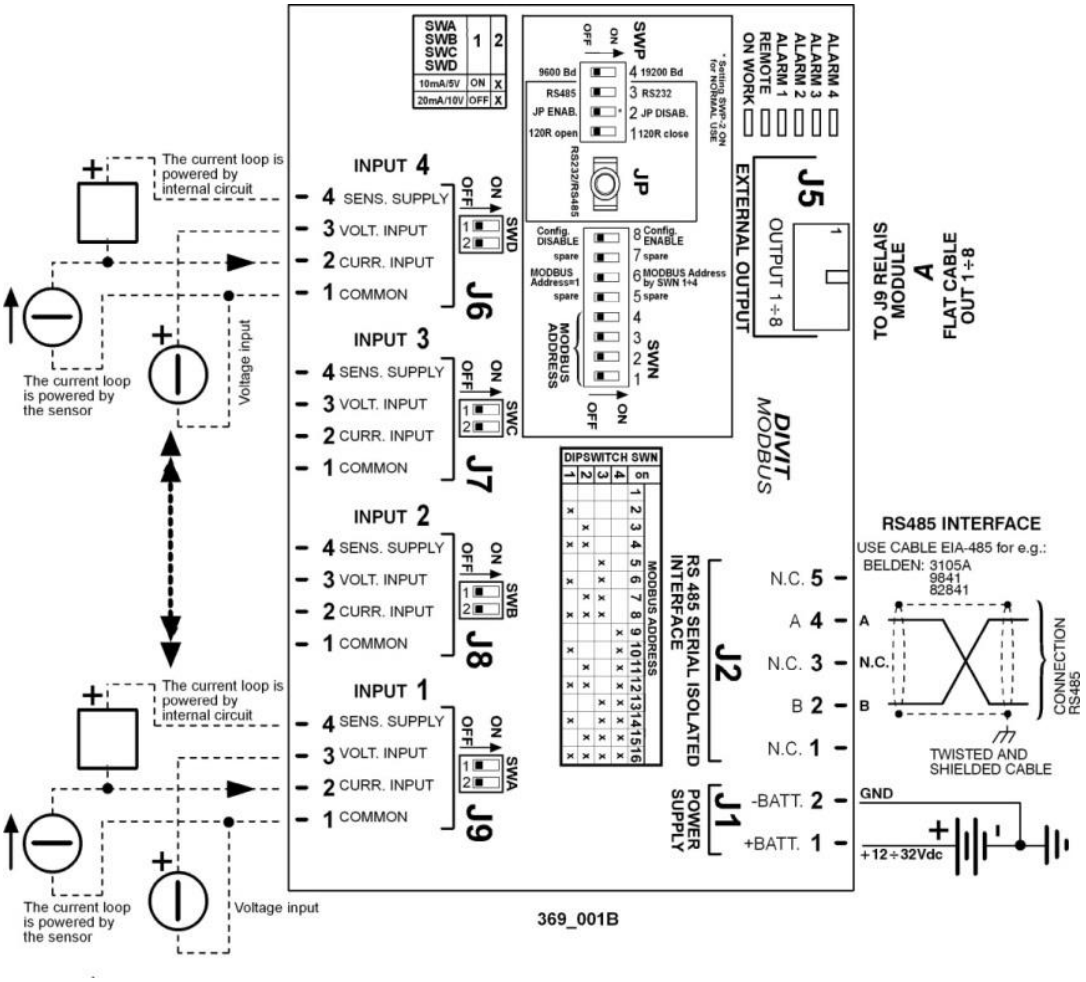


12. Summary of connections

12.1 CAN BUS version



12.2 RS485 version



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MECC ALTE SPA (HQ)

Via Roma
20 – 36051 Creazzo
Vicenza – ITALY

T: +39 0444 396111
F: +39 0444 396166
E: info@meccalte.it
aftersales@meccalte.it

MECC ALTE PORTABLE

Via A. Volta
1 37038 Soave
Verona – ITALY

T: +39 0456 173411
F: +39 0456 101880
E: info@meccalte.it
aftersales@meccalte.it

MECC ALTE POWER PRODUCTS

Via Melaro
2 – 36075 Montecchio
Maggiore (VI) – ITALY

T: +39 0444 1831295
F: +39 0444 1831306
E: info@meccalte.it
aftersales@meccalte.it

ZANARDI ALTERNATORI

Via Dei Laghi
48/B – 36077 Altavilla
Vicenza – ITALY

T: +39 0444 370799
F: +39 0444 370330
E: info@zanardialternatori.it

UNITED KINGDOM

Mecc Alte U.K. LTD
6 Lands' End Way
Oakham
Rutland LE15 6RF

T: +44 (0) 1572 771160
F: +44 (0) 1572 771161
E: info@meccalte.co.uk
aftersales@meccalte.co.uk

SPAIN

Mecc Alte España S.A.
C/ Rio Taibilla, 2
Polig. Ind. Los Valeros
03178 Benijofar (Alicante)

T: +34 (0) 96 6702152
F: +34 (0) 96 6700103
E: info@meccalte.es
aftersales@meccalte.es

CHINA

Mecc Alte Alternator (Nantong) Ltd
755 Nanhai East Rd
Jiangsu Nantong HEDZ 226100
People's Republic of China

T: +86 (0) 513 82325758
F: +86 (0) 513 82325768
E: info@meccalte.cn
aftersales@meccalte.cn

INDIA

Mecc Alte India PVT LTD
Plot NO: 1, Talegaon
Dhamdhere S.O.
Taluka: Shirur,
District: Pune - 412208
Maharashtra, India

T: +91 2137 673200
F: +91 2137 673299
E: info@meccalte.in
aftersales@meccalte.in

U.S.A. AND CANADA

Mecc Alte Inc.
1229 Adams Drive
McHenry, IL, 60051

T: +1 815 344 0530
F: +1 815 344 0535
E: info@meccalte.us
aftersales@meccalte.us

GERMANY

Mecc Alte Generatoren GmbH
Bucher Hang 2
D-87448 Waltenhofen

T: +49 (0)831 540755 0
E: info@meccalte.de
aftersales@meccalte.de

AUSTRALIA

Mecc Alte Alternators PTY LTD
10 Duncan Road, PO Box 1046
Dry Creek, 5094, South
Australia

T: +61 (0) 8 8349 8422
F: +61 (0) 8 8349 8455
E: info@meccalte.com.au
aftersales@meccalte.com.au

FRANCE

Mecc Alte International S.A.
Z.E. la Gagnerie
16330 St. Amant de Boixe

T: +33 (0) 545 397562
F: +33 (0) 545 398820
E: info@meccalte.fr
aftersales@meccalte.fr

FAR EAST

Mecc Alte (F.E.) PTE LTD
10V Enterprise Road, Enterprise 10
Singapore 627679

T: +65 62 657122
F: +65 62 653991
E: info@meccalte.com.sg
aftersales@meccalte.com.sg

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