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19 April 2024

TO: **AS PER ATTACHED TENDER BRIEFING ATTENDANCE REGISTER**

NOTICE No. 1

SUPPLIES & SERVICES CONTRACT No. 71 OF 2024: SECTIONS A AND B

SUPPLY, DELIVERY, INSTALLATION, COMMISSIONING, REPAIRS AND MAINTENANCE TO THE WATER AND SANITATION TELEMETRY AND SCADA INFRASTRUCTURE

SECTION A: TELEMETRY AND INSTRUMENTATION
SECTION B: SCADA ENGINEERING AND SUPPORT

Please effect the following changes as discussed at the Non-Compulsory Tender Briefing Meeting held on 18 April 2024:-

1.0 **PAGE 3/20-TECHNICAL REQUIREMENTS AND SPECIFICATIONS FOR SECTION A**

1.1 Remove the above page and replace with the attached.

1.2 The attached specifications (Motorola Ace 3600 Owner's Manual) provides additional information regarding Item Ref No.'s 1.8, 1.9, 1.10 and 1.11 on page 3/20. Tenderers are referred to the Items circled on pages 1-4 and 1-5 of the attached Manual.

2.0 **TENDER BRIEFING REGISTER**

Attached for your attention.

Further information regarding the Specifications may be obtained from Dinesh Ramkishwar (Senior Technologist) on either 033-342 2540 or e-mail address dinesh.ramkishwar@msunduzi.gov.za

Please note that this Notice forms part of the contract and a copy thereof must be submitted together with the tender.

Yours faithfully

for **SENIOR MANAGER: HEAD SUPPLY CHAIN MANAGEMENT**
Attachments

cc *Dinesh Ramkishwar*
Anesh Sewpersad

ANNEXURE A

SUPPLY, DELIVERY, INSTALLATION, COMMISSIONING, REPAIRS AND MAINTENANCE TO THE WATER AND SANITATION TELEMETRY AND SCADA INFRASTRUCTURE

SCHEDULE 1: TECHNICAL REQUIREMENTS AND SPECIFICATIONS: SECTION A: TELEMETRY AND INSTRUMENTATION

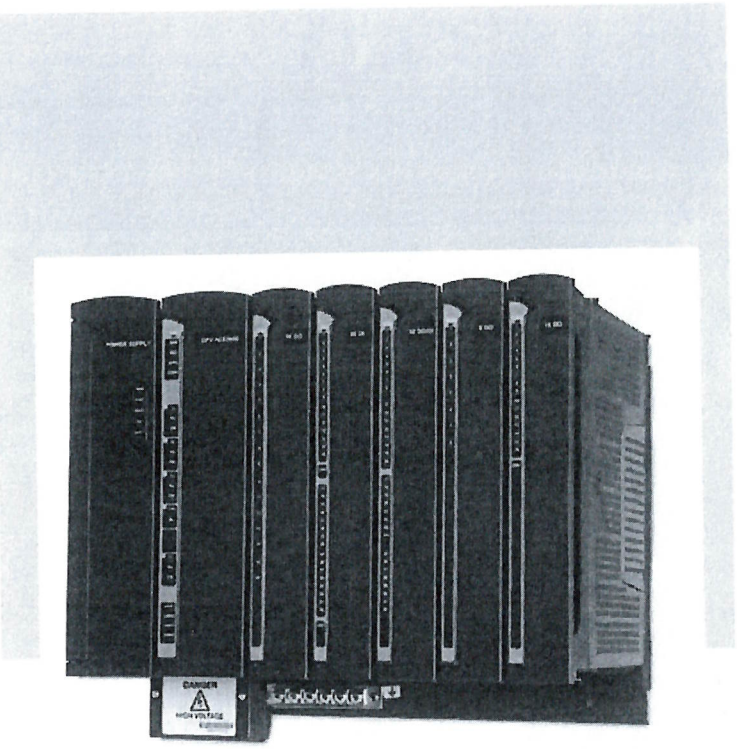
ITEM	ITEM DESCRIPTION	ITEM REF		DESCRIPTION	DELIVERY PERIOD (DAYS)	SPECIFICATIONS		
A	TELEMETRY AND INSTRUMENTATION	1,0	1,8	Motorola ACE RTU Housing Option 1			Housing/Mounting Type	No I/O slot frame
								Basic (default) model
								Can be installed on a wall
							Capacity Options	Power supply and CPU
								Metal chassis option
		1,0	1,9	Motorola ACE RTU Housing Option 2			Housing/Mounting Type	3 x I/O slot frame
								Can be installed on a wall
							Capacity Options	Power supply and CPU, up to 3 x I/Os
								Metal chassis option
		1,0	1.10	Motorola ACE RTU Housing Option 3			Housing/Mounting Type	Can be installed on a wall or in 19" rack/enclosure.
								Power supply and CPU, up to 8 I/Os
							Capacity Options	Metal chassis option for the following accessories:
								6.5 or 10 Ah Lead-Acid backup battery up to 2
								radios; up to four plastic boxes.
		1,0	1.11	Motorola ACE RTU Housing Option 4			Housing/Mounting Type	Large Metal NEMA 4X/IP65 Housing (OEM)
								Enables installation of radio, backup battery and other accessories
								Can be installed on a wall
							Capacity Options	Power supply and CPU, up to 7 x I/Os, 1 plastic interface box, up to 2 radios, 6.5 or 10Ahr Lead-Acid backup battery
		1,0	1.12	Motorola ACE 12V DC Power Supply Module			Input Voltage	10.8-16 VDC
							Outputs	Motherboard connector (to CPU and I/O modules): equal to input voltage, max. 4A
								AUX1A/AUX1B: equal to input voltage, max. 8 A
								AUX2A/AUX2B (configurable)
							Compatibility	Motorola ACE Product line

Owner's Manual

ACE3600 RTU

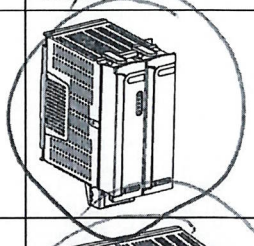
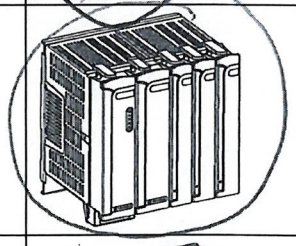
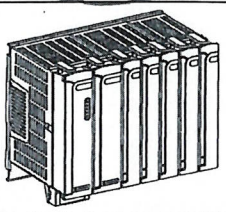
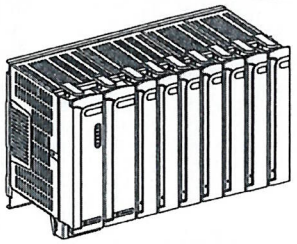
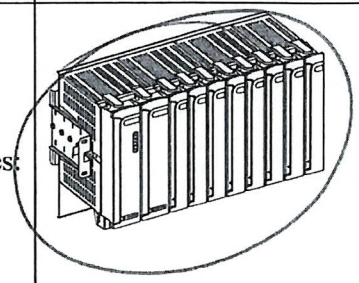
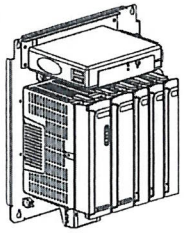
6802979C35-B

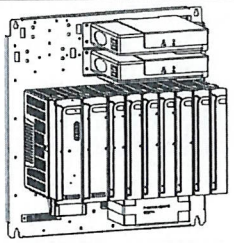
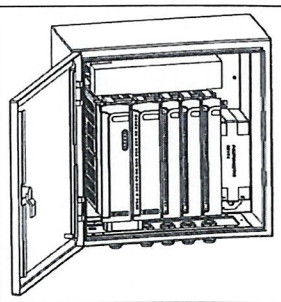
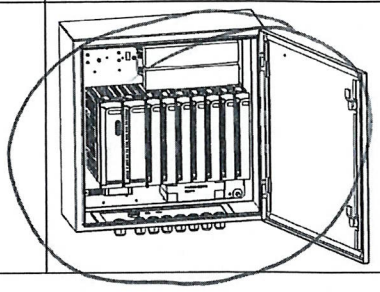
MOTOROLA



RTU Options

Each RTU can include a number of options, including portable and mobile radios, and plastic boxes with interface card for communication, etc.

Housing/Mounting Type	Capacity/Options	Illustration
No I/O slot frame Basic (default) model. Can be installed on a wall.	Power supply and CPU Can be ordered with metal chassis or housing options.	
3 I/O slot frame Can be installed on a wall.	Power supply and CPU, up to 3 I/Os Can be ordered with metal chassis or housing.	
5 I/O slot frame Can be installed on a wall.	Power supply and CPU, up to 5 I/Os Can be ordered with large metal chassis or housing.	
7 I/O slot frame Can be installed on a wall.	Power supply and CPU, up to 7 I/Os Can be ordered with large metal chassis or housing.	
8 I/O slot frame Can be installed on a wall or in 19" rack/enclosure.	Power supply and CPU, up to 8 I/Os Can be ordered with metal chassis option for accessories: 6.5 or 10 Ah Lead-Acid backup battery up to 2 radios; up to four plastic boxes.	
Small metal chassis Enables installation of radio, backup battery and other accessories. Can be installed on a wall or in housing.	Power supply and CPU, up to 3 I/Os, 1 mobile/portable radio, 1 plastic interface box, 6.5 Ah Lead-Acid backup battery	

Housing/Mounting Type	Capacity/Options	Illustration
Large painted metal chassis Enables installation of radio, backup battery and other accessories. Can be installed on a wall or in housing.	Power supply and CPU, up to 7 I/Os, 1 plastic interface box, up to 2 mobile/portable radios, 6.5 or 10 Ah Lead-Acid backup battery	
Small NEMA 4X/IP65 housing Enables installation of radio, backup battery and other accessories. Can be installed on a wall.	Power supply and CPU, up to 3 I/Os, 1 mobile/portable radio, 1 plastic interface box, 6.5 Ah Lead-Acid backup battery	
Large metal NEMA 4X/IP65 housing Enables installation of radio, backup battery and other accessories. Can be installed on a wall.	Power supply and CPU, up to 7 I/Os, 1 plastic interface box, up to 2 mobile/portable radios, 6.5 or 10 Ah Lead-Acid backup battery	

For installation instructions of each housing/mounting type, see the Installation chapter.

For the dimensions and weight of each combination, see Appendix A: General Specifications.

For a detailed list of all ACE3600 options, see the ACE3600 price pages and ordering information.

For a detailed description of the individual modules, see the appropriate chapter below.

Input/Output Connectors

The front panel of the power supply module (not including DC power supply low-tier) includes the following connectors.

Connector Name	Description	Notes
Auxiliary Output 1A	13.8V DC (±5%) @ 20°C User controlled power output. Short protected.	This output is used for powering radios, modems, etc. The output can be switched ON/OFF either by the user application program or using the STS hardware test. (Default = ON) For more information, see the Performing Hardware Tests section or Application Programmer section of ACE3600 STS User Guide.
Auxiliary Output 1B	Same as Auxiliary Output 1A	Same as Auxiliary Output 1A
Caution: Auxiliary Output 1A and 1B are ON by default with 13.8V DC. Do NOT plug in a radio which requires less voltage or the radio may be damaged.		
Auxiliary Output 2A	DC Power Output Selectable/programmable 3.3 to 9V DC or 13.8V DC (±5%) @ 20°C. User controlled power output. Short protected.	This output is used for powering radios, modems, etc. The output voltage can be set by the user using the STS site configuration. The output can be switched ON/OFF either using the STS hardware test or by the user application program. (Default = OFF) If both 2A and 2B are ON, they must have the same output level. The voltage levels of AUX2A and AUX2B are the same.
Auxiliary Output 2B	Same as Auxiliary Output 2A	Note: Auxiliary Output 2B can be ON independently of 2A. The voltage levels of AUX2A and AUX2B are the same.
Caution: If both 2A and 2B are ON, they must have the same output level. If cables are connected to Auxiliary Output 2A and 2B, they must use the same voltage.		

Power Supply Module Detailed Specifications

The following four charts detail the specifications of the various power supply modules.

12V DC Power Supply Module (Default)	
Input Voltage	DC 10.8-16 V The low limit of the DC power supply (10.8-16V) can be configured to 10.5V. The default is 10.8.
Outputs	Motherboard connector (to CPU and I/O modules): equal to input voltage, max. 4 A AUX1A/AUX1B: equal to input voltage, max. 8 A, on/off controlled by user program AUX2A/AUX2B (configurable): equal to input voltage (default), max. 8A, or 3.3, 5, 7.5, 9 V DC ±10%, max. 2.5A, on/off controlled by user program Note: max. 8 A total current consumption from all outputs
No Load Power Consumption	Max. 50 mA
Diagnostic LEDs	Status LED for: input voltage, AUX1 and AUX2 outputs, 12V control for DO modules
Input Protection	Internal Line Fuse, replaceable
Output Protection	AUX2A/B short circuit, automatic recovery on 3.3, 5, 7.5, 9 V
Dimensions	56 mm W x 225 mm H x 180 mm D (2.2" W x 8.7" H x 7.1" D)
Weight	Approx. 0.43Kg (0.95 Lb)

12V DC Low-Tier Power Supply Module	
Input voltage	10.8-16 V DC
Outputs	Motherboard connector (to CPU and I/O modules): The same as input voltage / max. 4 A AUX1A/AUX1B: equal to input voltage max. 8A Note: max. 8 A total current consumption from all outputs
Input Protection	Internal Line Fuse, replaceable
Dimensions	56 mm W x 225 mm H x 180 mm D (2.2" W x 8.7" H x 7.1" D)
Weight	Approx. 0.43Kg (0.95 Lb)

Specifications subject to change without notice.

Figure 4-2 provides a detailed view of the CPU front panel.

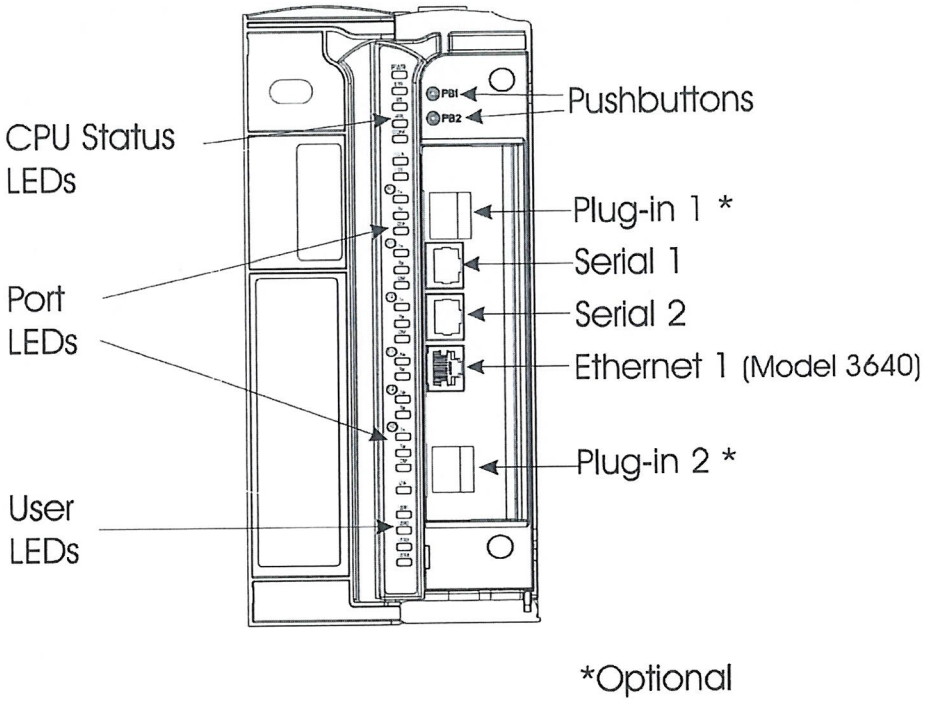


Figure 4-2 ACE3600 CPU (Model 3610/3640) – Front Panel

Front Panel

Communication Ports

The CPU module includes several communication ports:

<u>On Board ports:</u>

- Serial 1 (SI1) – RS232/RS485 serial port (configurable)
- Serial 2 (SI2) – RS232 serial port
- Eth1 (E1) - 10/100BaseT Ethernet port (CPU 3640 only)

<u>Plug-in ports bays, where different types of ports can be installed:</u>

- Plug-in 1 (PI1) – fits RS232, RS485, 10 MB Ethernet, 10/100 MB Ethernet, or Radio Modem Plug-in option
- Plug-in 2 (PI2) – fits RS232, RS485, 10 MB Ethernet, or Radio Modem Plug-in port option.

For the detailed specifications of each port, see CPU 3610/CPU 3640 Module Specifications below. For information on the cables and connectors, see Appendix C.

CPU 3610/CPU 3640 Module Specifications

Microprocessor	Freescale – Power PC II MPC8720, 32-bit, extended communication capability, DMA and floating point calculation support
Microprocessor Clock	200 MHz
Memory	Flash: 16 MB/3 MB free for user DRAM: 32 MB/10 MB free for user SRAM plug-in (Optional): 4 MB total, all free for user
Real-Time Clock	Full calendar with leap year support (year, month, day, hours, minutes, seconds). Time drift: max. 2.5 Seconds per day (when power is on)
SRAM and RTC Retention	3 V Rechargeable lithium backup battery
Serial Port 1	Configurable RS232 or RS485 port: - RS232: Asynch, Full Flow Control, up to 230.4 kb/s, GPS receiver interface - RS485, multi-drop 2-Wire up to 460.8 kb/s
Serial Port 2	RS232, Asynch, Full Flow Control, up to 230.4 kb/s, GPS receiver interface
Plug-In Port 1	Supports the following Plug-In ports: - Radio Modem, DPSK 1.2 kb/s, FSK 1.2/1.8/2.4 kb/s, DFM 2.4/3.6/4.8 kb/s - RS232, Sync/Asynch, Full Flow Control, up to 230.4 kb/s, GPS receiver interface - RS485, multi-drop 2-Wire up to 460.8 kb/s - Ethernet 10/100 Mb/s
Plug-In Port 2	Supports the following Plug-In ports: - Radio Modem, DPSK 1.2 kb/s, FSK 1.2/1.8/2.4 kb/s, DFM 2.4/3.6/4.8 kb/s - RS232, Sync/Asynch, Full Flow Control, up to 230.4 kb/s, GPS receiver interface - RS485, multi-drop 2-Wire up to 460.8 kb/s - Ethernet 10 Mb/s
Ethernet Port 1	10/100 Mb/s (on CPU 3640 only)
LEDs Display	4 CPU diagnostic LEDS, Port status LEDs and user application LEDs
Power Consumption (measured at power supply in)	Typical: 4W (280 mA @ 13.8VDC); LEDs on: 4.4W (320mA @ 13.8VDC)
Operating Voltage	10.8-16 V DC (from the motherboard connector)
Dimensions	56 mm W x 225 mm H x 180 mm D (2.2" W x 8.7" H x 7.1" D)
Weight	Approx. 0.38 Kg (0.84 Lb)

Specifications subject to change without notice.

DIGITAL INPUT MODULE

General Description

The ACE3600 Digital Input (DI) module can have 16 or 32 inputs.

The following DI modules are available.

- 16 DI Fast 24V
- 32 DI Fast 24V
- 16 DI Fast 24V IEC TYPE 2
- 32 DI Fast 24V IEC TYPE 2

Two types of voltage ("wet") inputs are supported, IEC 61131-2 Type II compliant inputs and 24V "MOSCAD compatible" inputs. In the 32 DI module, the first 20 inputs can function as fast counters. In the 16 DI module, all inputs can function as fast counters. A counter's maximum rate is dependent on the module type (see the specifications below.)

All the inputs are optically isolated. The DI modules support optional 24V DC floating plug-in power supplies (for contact "wetting" or other purposes).

Each DI can be an event trigger (interrupt-driven) to a high priority fast process. The high priority fast process enables very fast activation of an output in response to an input trigger and logical conditions. This high priority fast process is not dependent on the I/O scan (refer to the STS Application Programmer manual.)

For a description of I/O module construction, location, LEDs, TBs, and other common I/O module features, see the I/O Modules chapter above.

Figure 6-1 provides a general view of the ACE3600 DI module.

DI Module Specifications

16/32 DI FAST 24V Module	
Total Number of Inputs	16 DI; 32 DI
Input Arrangement	Isolated groups of 16 inputs with shared common
Fast Counter Inputs	Inputs that can be used as fast counters: - All inputs in 16 DI module; - First 20 inputs in 32 DI module
AC Input Frequency	45 – 65 Hz
AC Input Delay	Maximum 0.2 mS
Fast Counter Input Frequency	0 - 12.5 KHz, minimum pulse width 40 µS
Max. DC Input Voltage	Max. ±40 V DC (relative to input common)
"ON" DC Voltage Range	+9 to +30 V DC, -30 to -9 V DC
"OFF" DC Voltage Range	-3 to +3 V DC
"ON" AC Voltage Range	10 to 27 V AC (RMS)
"OFF" AC Voltage Range	0 to 5 V AC (RMS)
Input Current	Max. 2.5 mA
Fast Capture Resolution	1 mS (Interrupt upon change of state)
Event Time Tagging Resolution	1 mS (Interrupt upon change of state)
Input Filtering	0 to 50.8 mS (DC, programmable in 0.2 mSec steps)
Counter Input Filtering	0 to 12.75 mS (programmable in 0.05 mSec steps for inputs configured as high speed counters)
24 V DC Output	Supports optional isolated 24 V plug-in "Wetting" Power Supply (one in 16 DI, two in 32 DI)
Diagnostic LEDs	Status LED per each input, module error LED, 24V plug-in status LED
User Connection	2 or 4 Terminal Blocks (3.5mm pitch), Maximum 18 AWG
Cable and TB Holder	20 or 40 Wire Cable with TB Holder connector, 26 AWG wires
Module Replacement	Hot swap replacement – module extraction/insertion under voltage
Input Isolation	2.5 kV DC/AC between input and module logic per IEC255-5
Input Insulation	Insulation resistance 100 MΩ @ 500 V DC, Insulation impulse 5 kV per IEC255-5
Operating Voltage	10.8-16 V DC and 3.3 V DC (from the motherboard connector)
Power Consumption (measured at power supply in)	16 DI: 0.32 W typical with all LEDs on (23 mA @ 13.8 VDC) 32 DI: 0.55 W typical with all LEDs on (40 mA @ 13.8 VDC) (Not including 24 V DC Plug-in Power Supply power consumption)
Dimensions	37 mm W x 225 mm H x 180 mm D, (1.5" W x 8.7" H x 7.1" D)
Weight	16 DI: approx. 0.28 Kg (0.62 Lb); 32 DI: approx. 0.29 Kg (0.63 Lb)

DIGITAL OUTPUT/DIGITAL INPUT FET MODULE

General Description

The Digital Output/Digital Input (DO/DI) FET module has 16 or 32 configurable user connections, organized in four groups. Each group can be configured as an 8 DO group or as an 8 DI group.

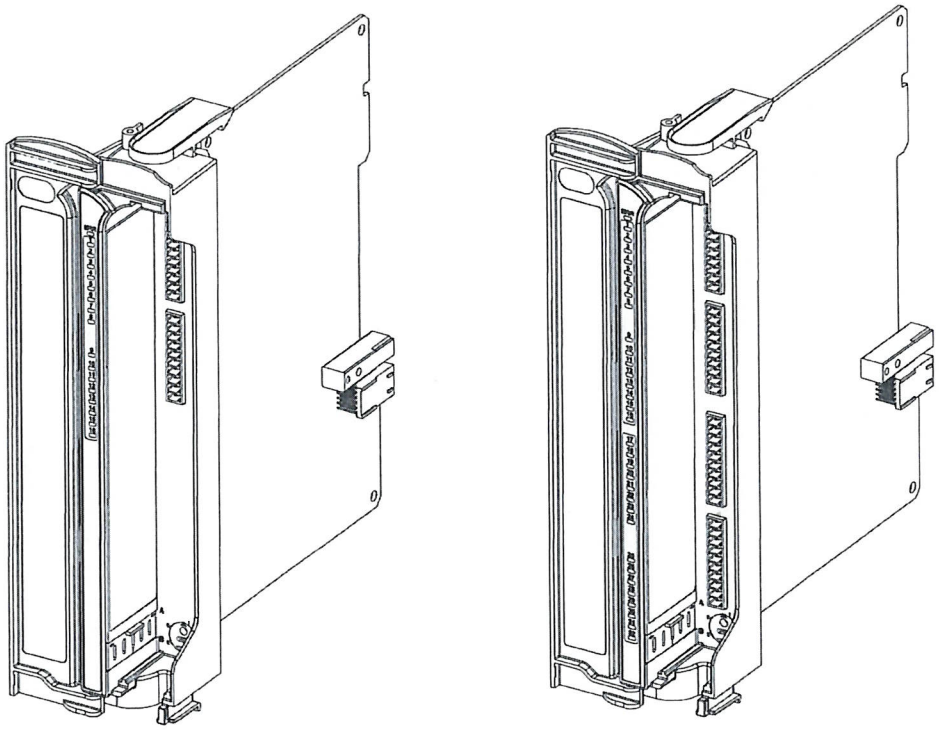
The following Digital Output/Digital Input (DO/DI) FET modules are available.

- 16 (DO/DI) FET
- 32 (DO/DI) FET

The outputs are optically isolated current sink FET type with back indication. The inputs are optically isolated Dry Contact type with internal "wetting" voltage.

For a description of I/O module construction, location, LEDs, TBs, and other common I/O module features, see the I/O Modules chapter above.

Figure 7-1 provides a general view of the ACE3600 DO/DI FET module.



16 DO/DI FET Module **32 DO/DI FET Module**

Figure 7-1 ACE3600 DO/DI FET Module – General View

DO/DI FET Module Specifications

Total Number of I/Os	16; 32
I/O Arrangement	Two or four group of 8 I/Os with shared common Each group can be configured as FET DO or dry contact DI. Selectable combinations (32 DO/DI): 32 DO/8 DI+24 DO/ 16 DI+16 DO/24 DI+8 DO/32 DI Selectable combinations (16 DO/DI): 16 DO/8 DI+8 DO/16 DI+16 DI
Counter Inputs	20 first inputs can be used as counter inputs
Counter Input Frequency	0 - 1 KHz, minimum pulse width 500 µS. Note: Although filters are defined in steps of 0.2mSec and 0.05mSec, it is relevant only from 1mSec and above.
Max. DC Input Voltage	Max. 30 V DC (relative to input common)
Input "ON" Resistance	0-4 kΩ
Input "OFF" Resistance	≥50 kΩ
Fast Capture Resolution	1 mS (Interrupt upon change of state)
Event Time Tagging Resolution	1 mS (Interrupt upon change of state)
Input Current	Max. 0.3 mA (when the input is shorted)
Input Filtering	0 to 50.8 mS (programmable in 0.2 mSec steps), relevant only from 1mSec
Counter Input Filtering	0 to 12.75 mS (programmable in 0.05 mSec steps), relevant only from 1mSec
Output Type	MOSFET
Output Voltage Range	5-30 V DC (user supplied voltage)
DO Frequency	Max. 1 KHz (resistive load)
DO Output Current	Max. 500 mA sink current (resistive load)
Output Fail State	Configurable output state on CPU fail: On, Off or 'last value'
Diagnostic LEDs	LED per each input / output status, module error LED
User Connection	4 Terminal Blocks (3.5mm pitch), Maximum 18 AWG
Cable and TB Holder	20 or 40 Wire Cable with Terminal Block Holder connector, 26 AWG
Module Replacement	Hot swap replacement– module extraction / insertion under voltage
Input / Output Isolation	2.5 kV between input/output and module logic
Input Insulation	Insulation resistance 100 MΩ @ 500 V DC per IEC255-5
Operating Voltage	10.8-16 V DC and 3.3 V DC (from the motherboard connector)
Power Consumption (measured at power supply in)	16 DO/DI: 0.55 W typical with all LEDs/all outputs on (40 mA @ 13.8 VDC) 32 DO/DI: 1 W typical with all LEDs/all outputs on (72 mA @ 13.8 VDC)
Dimensions	37 mm W x 225 mm H x 180 mm D (1.5" W x 8.7" H x 7.1" D)

DIGITAL OUTPUT RELAY MODULE

General Description

The DO Relay modules have 8 or 16 outputs.

There are two types of DO relays:

- Electrically Energized (EE) - the outputs return to the non-energized state in case of power off or module failure.
- Magnetically Latched (ML) - Relay outputs are magnetically latched, the outputs maintain their state in case of power off or module failure.

The following DO relays modules are available:

- 8 DO EE Relay 2A
- 16 DO EE Relay 2A
- 8 DO ML Relay 2A
- 16 DO ML Relay 2A

For a description of I/O module construction, location, LEDs, TBs, and other common I/O module features, see the I/O Modules chapter above.

Figure 8-1 provides a general view of the ACE3600 DO Relay Module.

ANALOG INPUT MODULE

General Description

The Analog Input (AI) modules have 8 or 16 inputs. The modules sample and convert analog data into digital format and transfer the digital data to the CPU module.

The following modules are available:

- 8 AI ±20 mA (supports 4-20 mA)
- 16 AI ±20 mA (supports 4-20 mA)
- 8 AI ±5 V (supports 0-5 V and 1-5 V)
- 16 AI ±5 V (supports 0-5 V and 1-5 V)

The module's analog-to-digital conversion resolution is 16 bit (including sign). Each input is fully isolated from the other inputs on the module and also optically isolated from the module internal circuits. The modules are fully calibrated and can be tested and recalibrated in the field.

The measured values are digitally filtered to reduce the 50 or 60 Hz noise. The user can select the filtering frequency per module.

The measured values can be smoothed by digital filtering. Smoothing is accomplished by calculating the running average values of a defined number of converted analog values (samples). The user can select the level of smoothing per module. The higher the smoothing level chosen, the more stable is the smoothed analog value and the longer it takes until the smoothed analog signal is applied after a step response.

The user can select how the analog values are represented to the user application program as unit-less numeric values or as scaled values that represent certain Engineering Units (EGU).

Each AI module can include an optional plug-in floating 24V DC power supply to power external devices.

Each analog input has two status LEDs:

- UF - indicates Underflow when lit
- OF - indicates Overflow when lit

For a description of I/O module construction, location, LEDs, TB holder, and other common I/O module features, see the I/O Modules chapter above.

For details on specific AI parameters and configuration, see AI Module Configuration below.

AI Module Specifications

Total Number of Inputs	8 AI ±20 mA (4-20 mA) 16 AI ±20 mA (4-20 mA) 8 AI ±5 V (0-5 V, 1-5 V) 16 AI ±5 V (0-5 V, 1-5 V)
Input Configuration	Isolated (floating) analog inputs
A to D Resolution	16 bit (including sign)
Input Accuracy	±0.1% of full scale @ -40°C to +70°C
Input Sampling Time	10 mSec @ 50 Hz filtering; 8.33 mSec @ 60 Hz filtering
Smoothing	Selectable input averaging:1,2,4,8,16,32,64,128 samples (x10 mS)
Permitted Potential Between Inputs	75 V DC, 60 V AC (RMS)
Input Impedance	±20 mA input: Rin < 250 Ω ±5 V input: Rin > 1 MΩ
Crosstalk Rejection	Better than 80 dB between any pair of inputs
Temperature Stability	25 PPM/°C
Interference Suppression	Selectable 50 or 60 Hz filtering, Common mode rejection > 80 dB, Differential mode rejection > 50 dB
24 V DC Output	Supports optional isolated 24V Plug-in Power Supply (one in 16 DI, two in 32 DI)
Diagnostic LEDs	Overflow and Underflow LED per each input status, Module error LED, 24V Plug-in status LED The module Overflow and Underflow levels can be configured to: Current inputs: ±20mA / 4-20 mA Voltage inputs: ±5 V / 0-5 V /1-5 V
User Connection	2 or 4 Terminal Blocks (3.5mm pitch), Maximum 18 AWG
Cable and TB Holder	20 or 40 Wire Cable with TB Holder connector, 26 AWG
Module Replacement	Hot swap replacement– module extraction/insertion under voltage
Input Isolation	1.5 kV between input and module logic
Input Insulation	Insulation resistance 100 MΩ @ 500 V DC, per IEC255-5
Operating Voltage	10.8-16 V DC and 3.3 V DC (from the motherboard connector)
Power Consumption (measured at power supply in)	8 AI: 0.9 W typical with all LEDs on (65 mA @ 13.8 VDC) 16 AI: 1.3W typical with all LEDs on (95 mA @ 13.8 VDC) (Not including 24 V Plug-in Power Supply)
Dimensions	37 mm W x 225 mm H x 180 mm D, (1.5" W x 8.7" H x 7.1" D)
Weight	8 AI : approx.032 Kg (0.71 Lb) 16 AI: approx. 0.34 Kg (0.75 Lb)

Specifications subject to change without notice.

MIXED I/O MODULE

General Description

The ACE3600 Mixed I/O modules include a mixture of Digital Inputs, Relay Outputs and Analog Inputs on the same module.

The available Mixed I/O modules are:

- 16 Digital Inputs + 4 EE DO Relay Outputs + 4 Analog Inputs (±20 mA)
- 16 Digital Inputs + 4 ML DO Relay Outputs + 4 Analog Inputs (±20 mA)

Figure 11-1 provides a general view of the ACE3600 Mixed I/O module.

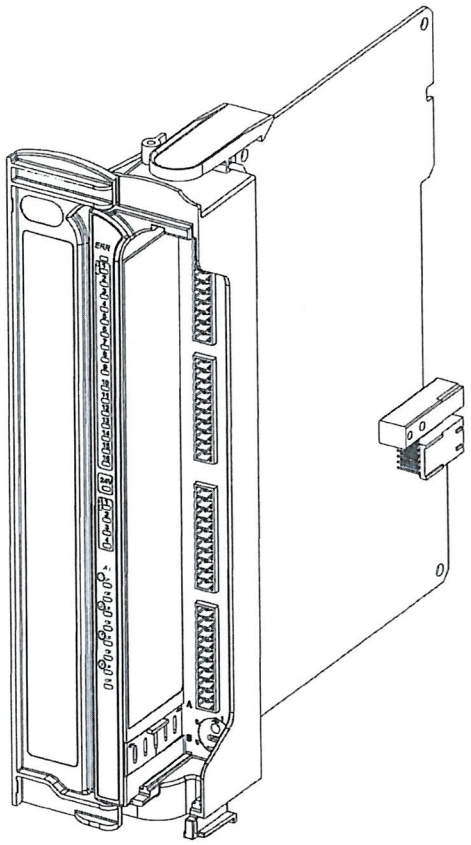


Figure 11-1 ACE3600 Mixed I/O Module – General View

Another type of mixed I/O is found on the Digital Output/Digital Input (DO/DI) FET module. See the Digital Output/Digital Input (DO/DI) FET module chapter above for more information.

Mixed I/O Module Specifications

Total Number of Inputs / Outputs	16 Digital Inputs + 4 EE Relay Outputs + 4 Analog Inputs (±20 mA) 16 Digital Inputs + 4 ML Relay Outputs + 4 Analog Inputs (±20 mA)
I/O Arrangement	1 group of 16 DIs with shared common 4 relay outputs - Form C 4 isolated analog inputs
DI Counter Inputs	All inputs can be configured as fast counters
DI Frequency	0 - 1 KHz
DI Fast Counter Frequency	0 - 5 KHz, minimum pulse width 100 µS
DI Max. DC Voltage	Max. 40 V DC
DI "ON" DC Voltage Range	+11 to +30 V DC, -30 to -11 V DC
DI "OFF" DC Voltage Range	-5 to +5 V DC
DI Current	6-10 mA
Fast Capture Resolution	1 mS (Interrupt upon change of state)
Event Time Tagging Resolution	1 mS (Interrupt upon change of state)
DI Filtering	0 to 255 mSec (DC, programmable in 1 mSec steps)
DI Counter Filtering	0 to 6.375 mSec (programmable in 0.025 mSec steps for inputs configured as high speed counter)
DO Contact Voltage Ratings	Max. 60 V DC or 30 V AC RMS (42.4 V peak).
DO Contact Power Ratings	2A @ 30 V DC, 0.6A @ 60V DC or 0.6A @ 30V AC (resistive load)
DO Relay Back Indication	Contact position - hardware back indication
DO Fail State	Configurable relay state on CPU fail: On, Off or 'last value'
AI Resolution	16 Bit (including sign)
AI Accuracy	±0.1% of full scale @ -40°C to +70°C
AI Sampling Time	10 mSec @ 50 Hz filtering 8.33 mSec @ 60 Hz filtering
AI Smoothing	Selectable input averaging: 1, 2, 4, 8, 16, 32, 64 or 128 samples (x10 mS)
AI max. Potential between AIs	75 V DC, 60 V AC (RMS)
AI Impedance	Rin < 250 Ω
AI Crosstalk Rejection	Better than 80 dB between any pair of inputs

FHN7007A) on the signal cable (FKN8438A) near the bottom of the CPU door, loop the cable one turn around it, and clamp the ferrite on the cable.
Connect the other end of the communication cable to the ACE3600 CPU module port configured for the radio. (See Figure 13-2 and Figure 13-4.) For digital mode use any of the serial on-board or plug-in ports. For analog mode only the plug-in ports may be used. See RTU Port Configuration for the Astro IV&D Digital Radio and RTU Port Configuration for the Astro IV&D Analog Trunked Radio below.

4. Connect the DC power cable (FKN8436A) to the Power connector on the radio and the free red wire to the ignition pin on the FKN8432A/FKN8438A cable. Connect the opposite end of the power cable to the AUX2A or AUX2B connector on the ACE3600 power supply unit. (See Figure 13-2 and Figure 13-4.)

Figure 13-1 XTL5000/XTL2500 Radio and Metal Bracket

4. Connect the antenna cable (FKN8437A) to the Antenna connector on the radio and to the opening on the bottom of the ACE3600 RTU housing, using the four supplied screws. See Figure 13-13 and Figure 13-15.)

5. Attach the radio to the bracket (0789422V45 from FHN6898A) by using screws and washers from kit FHN6898A. See Figure 13-14 below.

Figure 13-14 CDM750 Radio and Metal Bracket

6. Attach the complex (radio + bracket) using the four supplied screws to the ACE3600 chassis. See Figure 13-15 below.

MDS Radio Installation Kit

The MDS installation kit (V152AK/FLN3853A) enables the user to install the 9810 Spread Spectrum, 9710A- 900 MHz and 4710 UHF Transceiver radio modems in ACE3600 Remote Terminal Units (RTU). The kit includes a bracket and cables.

Installation

The MDS radio can be mounted on the ACE3600 RTU as follows:

Procedure 13-27 How to Install the MDS 900 Radio on the Metal Chassis

1. Connect the radio to the bracket provided in the Hardware Kit (#0789971V39 from FHN7066A) using the four screws, supplied with the bracket. (See Figure 13-52 below.)

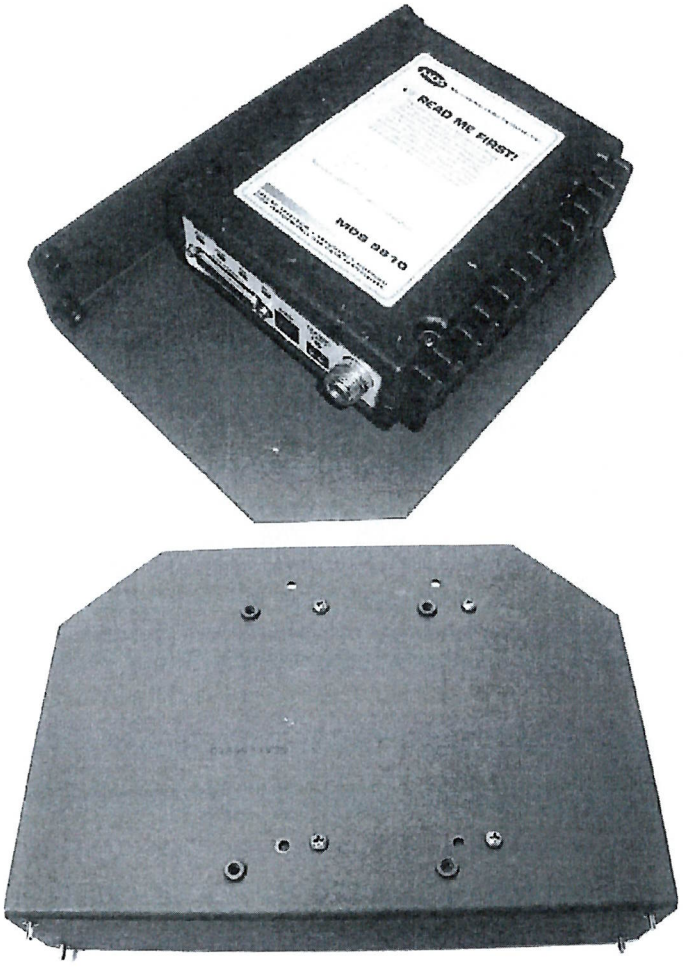


Figure 13-52 MDS Radio Mounted on Metal Bracket - Front and Rear View

2. Connect the communication cable (FKN8513A) to the 25-pin connector on the side of the radio and tighten the screws.