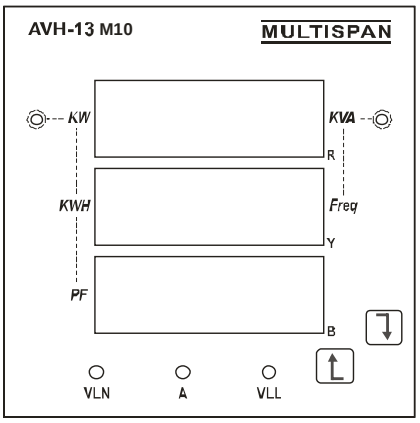
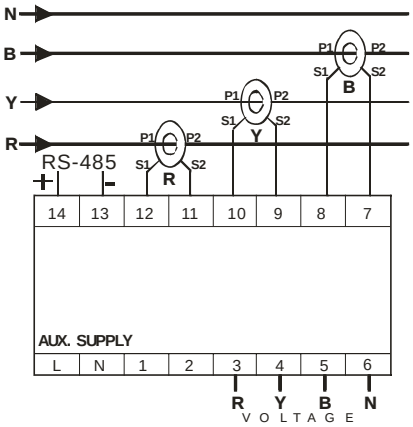
AVH 13 M10 Modbus Interface (485 - RTU)



CONNECTION DIAGRAM:



For current higher than 5 Ampere
(With External CT)

FRONT BACK

MODEL: AVH-13 M10
SIZE: 96 x 96
PARAMETERS: For Three Phases

1. Phase to Neutral Voltage
2. Phase Current
3. Phase to Phase Voltage
4. KVA – Frequency (Average)
5. KW - KWH – PF (Average)

User Interface:

To check/change value of the parameter use below methods.

To enter into setting menu press and hold UP & DOWN key together for 1.5 seconds.

Display will show value of ct ratio selected. On display upper 4digit will show CTR message and middle 4digit will show value of CT ratio.

To vary the parameter release either key, [Press and Hold] or [tape] the individual key.

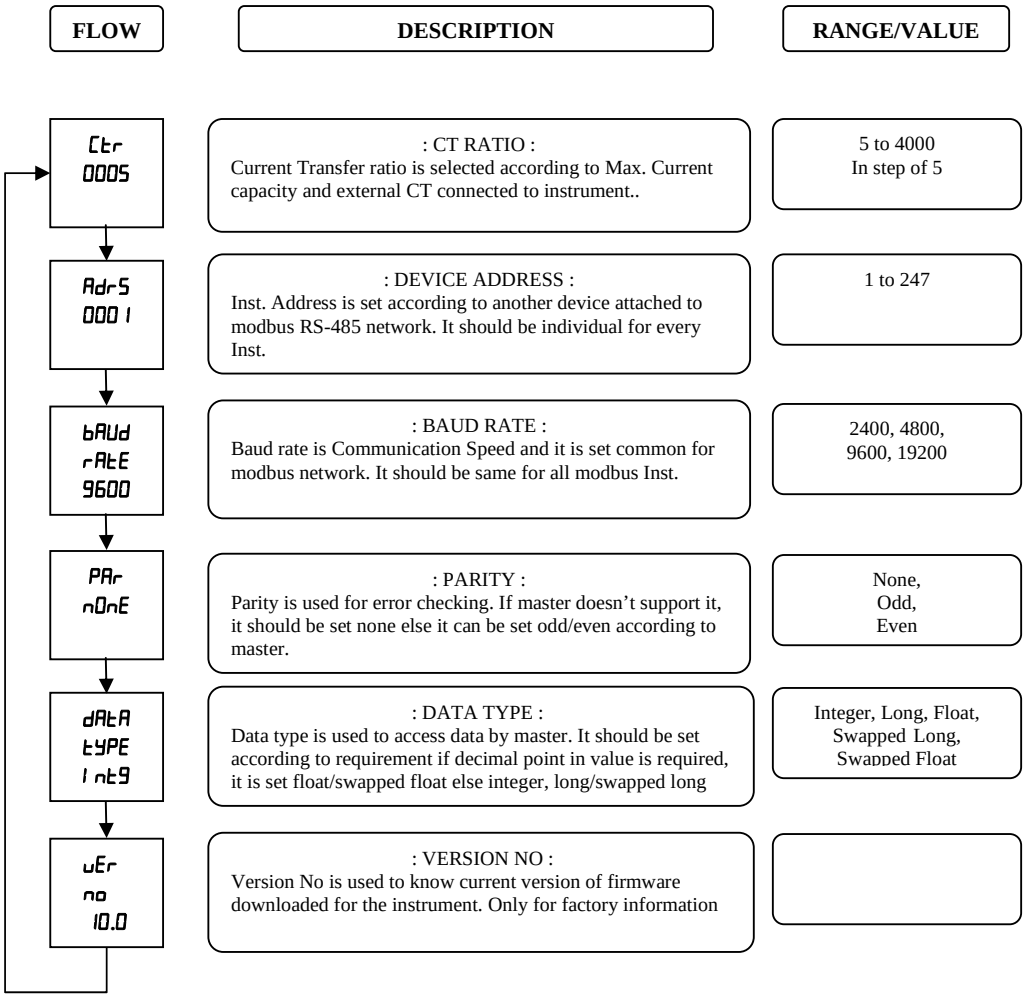
To increase the parameter use UP key and to decrease the parameters use the DOWN key.

To move to the next parameter, again press and hold both the keys (UP& DOWN) for 1.5 seconds.

Each and every time moving to next parameter, previous parameter value gets updated. After setting all the parameters, it gets back to indication automatically in 5 seconds and all settings get stored.

Menu Page flow chart is given as below.

Press and hold UP & DOWN key together to scroll parameters.



Parameters and their significance are explained below.

1. **CT RATIO:**

   CT Ratio is used when input current is higher than 5 Amp internal CT. User can select or connect external CT from 10/5 to 4000/5.CT Ratio is set according to external CT (current transformer) connected. If any external ct is not connected to instrument than CT Ratio should be set to 5.

2. **ADDRESS:**

   Address is used to specify identity of instrument for modbus communication. Instrument address is used to access data from it so it should be set individual/different from all other instrument address attached to modbus network.

3. **BAUDRATE:**

   Baud rate defines speed which is used to communicate with device generally 9600 baud rate is used in most of modbus network. If distance is small and data to be transfer is large then high (19200 /9600) baud rate is used and if environment surrounding instrument is noisy (EMI & EMC) than lower (4800 / 2400) baud rate should be selected for communication.

4. **PARITY:**

   Parity is used for error checking at byte level. So as and when byte is received first parity is checked for the errorless communication. Parity can be selected **Odd** or **Even** and also Parity checking can be disabled by selecting **None** option for parity.

5. **DATA TYPE:**

   Data type is used to define storage pattern for data in register bank. Register bank pattern in Modbus is fixed for 16bit (integer) data type. Integer data type is used define value of process parameter without decimal point. Integer data type can represent process value from -32768 to +32767. If parameter represents value more than integer range then data type should be defined as long. It is used to represent value from -2147483648 to 2147483647 without decimal part. To represent the value with decimal point and for high range data type should be defined as float. Float can represent value with decimal point and for a very long value. But both Long and Float data types are of 32 bit so register bank pattern is changed.

   If no of parameter supported by instrument is of 5 than bank pattern for various data type is given in below tables.

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Register	Integer	long & Float	Swapped Long & Float
….1	PV 1	PV1 LOW	PV1 HIGH
….2	PV2	PV1 HIGH	PV1 LOW
….3	PV 3	PV2 LOW	PV2 HIGH
….4	PV4	PV2 HIGH	PV2 LOW
….5	PV5	PV3 LOW	PV3 HIGH
….6		PV3 HIGH	PV3 LOW
….7		PV4 LOW	PV4 HIGH
….8		PV4 HIGH	PV4 LOW
….9		PV5 LOW	PV5 HIGH
….10		PV5 HIGH	PV5 LOW

*PV = process value

It is recommended that for the parameter with decimal point set data type as float. So two no of register is occupied per one parameter.

AVH 13 M10 represents 15 different parameters.

Integer

Address	parameter
30001	Voltage R phase
30002	Voltage Y phase
30003	Voltage B phase
30004	Current R phase
30005	Current Y phase
30006	Current B phase
30007	Voltage RY phase
30008	Voltage YB phase
30009	Voltage BR phase
300010	KVA
300011	Frequency
300012	KW(Kilo watt)
300013	KWH(Kilowatt Hour)
300014	PF(Power factor)
300015	Version Of Software

Long / float

Address	Parameter
30001	Voltage R phase (Low 16 bit)
30002	Voltage R phase (High 16 bit)
30003	Voltage Y phase (Low 16 bit)
30004	Voltage Y phase (High 16 bit)
30005	Voltage B phase (Low 16 bit)
30006	Voltage B phase (High 16 bit)
30007	Current R phase (Low 16 bit)
30008	Current R phase (High 16 bit)
30009	Current Y phase (Low 16 bit)
300010	Current Y phase (High 16 bit)
300011	Current B phase (Low 16 bit)
300012	Current B phase (High 16 bit)
300013	Voltage RY phase (Low 16 bit)
300014	Voltage RY phase (High 16 bit)
300015	Voltage YB phase (Low 16 bit)
300016	Voltage YB phase (High 16 bit)
300017	Voltage BR phase (Low 16 bit)
300018	Voltage BR phase (High 16 bit)
300019	KVA (Low 16 bit)
300020	KVA (High 16 bit)
300021	Frequency (Low 16 bit)
300022	Frequency (High 16 bit)
300023	KW(Kilo watt) (Low 16 bit)
300024	KW(Kilo watt) (High 16 bit)
300025	KWH(Kilowatt Hour) (Low 16 bit)
300026	KWH(Kilowatt Hour) (High 16 bit)
300027	PF(Power factor) (Low 16 bit)
300028	PF(Power factor) (High 16 bit)
300029	Version No. (Low 16 bit)
300030	Version No. (High 16 bit)

Swapped Long / float

Address	Parameter
30001	Voltage R phase (High 16 bit)
30002	Voltage R phase (Low 16 bit)
30003	Voltage Y phase (High 16 bit)
30004	Voltage Y phase (Low 16 bit)
30005	Voltage B phase (High 16 bit)
30006	Voltage B phase (Low 16 bit)
30007	Current R phase (High 16 bit)
30008	Current R phase (Low 16 bit)
30009	Current Y phase (High 16 bit)
300010	Current Y phase (Low 16 bit)
300011	Current B phase (High 16 bit)
300012	Current B phase (Low 16 bit)
300013	Voltage RY phase (High 16 bit)
300014	Voltage RY phase (Low 16 bit)
300015	Voltage YB phase (High 16 bit)
300016	Voltage YB phase (Low 16 bit)
300017	Voltage BR phase (High 16 bit)
300018	Voltage BR phase (Low 16 bit)
300019	KVA (High 16 bit)
300020	KVA (Low 16 bit)
300021	Frequency (High 16 bit)
300022	Frequency (Low 16 bit)
300023	KW(Kilo watt) (High16 bit)
300024	KW(Kilo watt) (Low 16 bit)
300025	KWH(Kilowatt Hour) (High 16 bit)
300026	KWH(Kilowatt Hour) (Low 16 bit)
300027	PF(Power factor) (High 16 bit)
300028	PF(Power factor) (Low 16 bit)
300029	Version No. (High 16 bit)
300030	Version No. (Low 16 bit)

- **Communication Installation**

RS-485

The communication port and protocol of AVH -13 M10 are RS485 and Modbus-RTU. The terminals of communication are +, -. Up to 32 devices can be connected on a RS485 bus. Use good quality shielded twisted pair cable. The overall length of the RS485 cable connecting all devices can not exceed 1200m (4000ft). AVH -13 M10 is used as a slave device of master like PC, PLC, data collector or RTU. If the master does not have RS485 communication port, a converter has to be used. Normally a RS232/RS485 or USB/RS485 is adopted. The topology of RS485 net can be line, circle and star.

- Line Mode: The connection from master to AVH-13 M10 meter in line mode is individually in the RS485 network. If communication quality is poor, it is normally added to the circuit beside the last AVH-13 M10 meter.
- Circle Mode: AVH-13 M10 meters are connected in a closed circle when high reliability is desired. In some cases, there is no need of antisignal reflecting resistor.
- Star Mode: The RS485 network is connected in a wye format. Anti signal reflecting resistors may be required in each line.

The following instructions during wiring are advisable to ensure excellent quality.

- Communication: Good quality shielded twisted pair of cable.
- The shield of each segment of the RS485 cable must be connected to the ground at one end only.
- Keep cables away as much as possible from sources of electrical noise.
- Use RS232/RS485 or USB/RS485 converters with optical isolated outputs and surge protection.

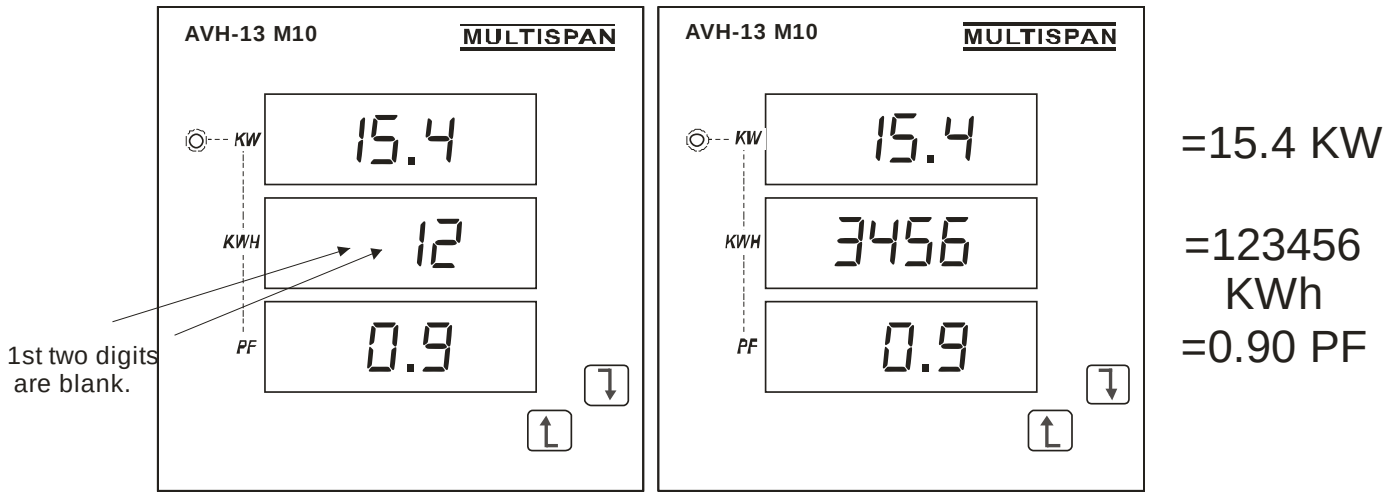
- **"KWh Reading"**

KWh is shown in middle display.
Maximum value of KWh is 999999 (Six digits)

As the number of digits is 4 higher value reading will be shown as follows.

1) Value up to 4 digits (i.e. up to 9999) is shown in normal way.
2) When this value is 5 or 6 digits, the display is split in two parts, 2D + 4D, which will be shown one after another in the middle display. (Both the parts will toggle at roughly 2 second interval.)

For example: if the value is 123456 KWh, then it will be shown as follows.



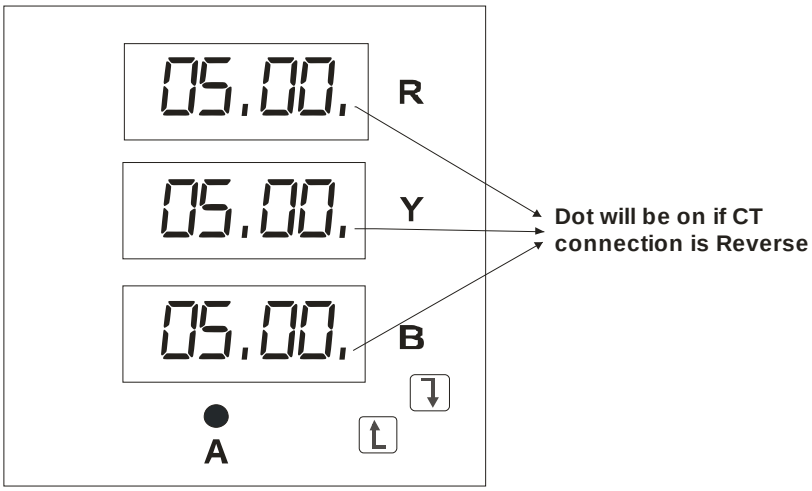
1st Part 2nd Part

Means: KW = 15.4 KW
KWh = 123456 KWh
PF = 0.9 PF
Each part remains steady for 2 second approximately.

➢ **CT Ratio Selection:**

- Keep pressing front panel key for 4 Seconds. Display-1 will show . Display-2 will show current CT ratio.
- Now release the key and press key to change CT ratio.
- To store selected CT Ratio in non-volatile memory, release the key and wait for 5 Seconds. Instrument will automatically stores CT Ratio and starts operating normally.

➢ **Reverse Phase Indication:**



NOTE: If the dot (as shown in above diagram) Of current display is ON, that means the CT Connection (S1 & S2) is reverse therefore Interchange the CT wires to show proper value Of KW & KWh